Volume 1 February 1953 Number 2

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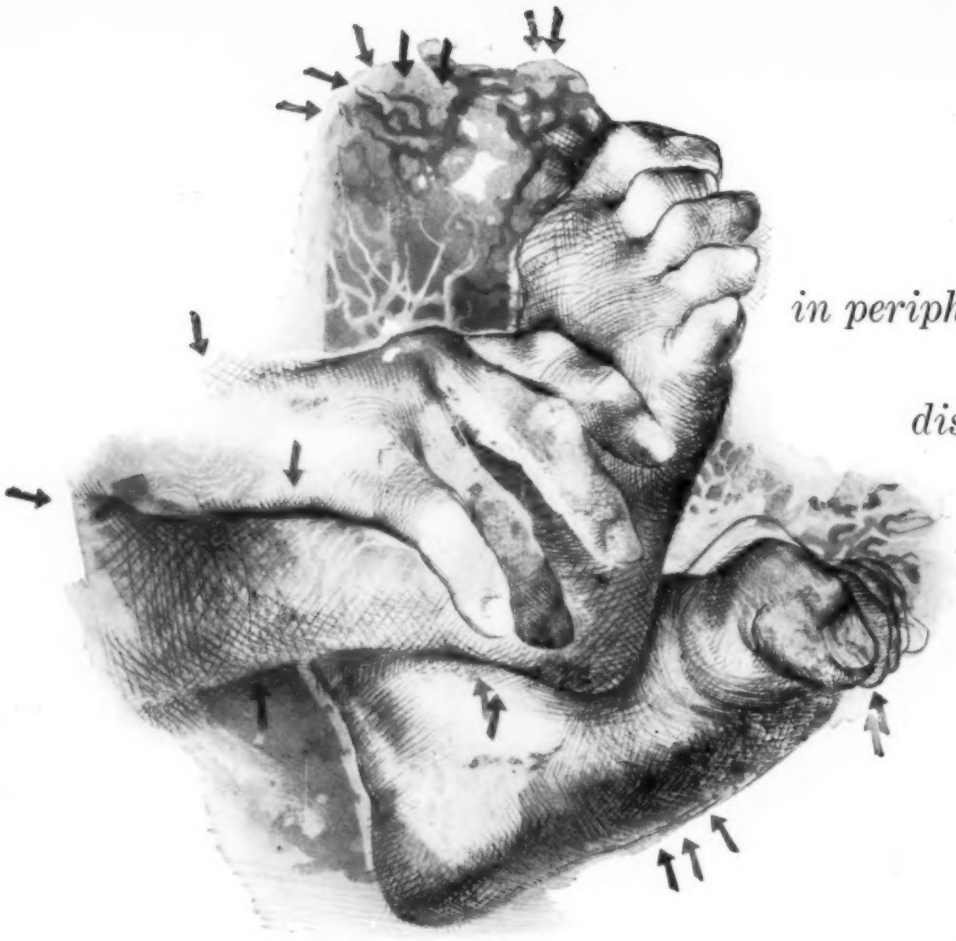
JOURNAL OF

THE AMERICAN GERIATRICS SOCIETY

OFFICIAL JOURNAL OF THE AMERICAN GERIATRICS SOCIETY

PUBLISHED BY THE WILLIAMS & WILKINS CO.
MOUNT ROYAL AND GUILFORD AVENUES, BALTIMORE 2, MARYLAND

ANNUAL MEETING - NEW YORK - MAY 28, 29, 30, 1953



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THE JOURNAL OF

The American Geriatrics Society

Official Journal of the American Geriatrics Society

VOLUME I | ***February, 1953*** | NUMBER 2

THE JOURNAL OF THE AMERICAN GERIATRICS SOCIETY

In January 1953 the first issue of the new JOURNAL OF THE AMERICAN GERIATRICS SOCIETY was published. This is the only official journal of the American Geriatrics Society and will be published monthly by The Williams & Wilkins Company of Baltimore. The Journal is the property of the Society, and the Society controls its editorial and advertising policies. The yearly dues of $15.00 cover a subscription to the journal.

The Editor and Associate Editors are very grateful to the various members of the Society and to others who have submitted manuscripts. An adequate amount of material is now on hand or in sight to fill most of the issues in 1953. However, the Journal is always anxious to have submitted to it manuscripts dealing with all the clinical aspects of aging and, in particular, original manuscripts which present new data.

W. O. THOMPSON, M.D.
Editor

THE SURGERY OF MITRAL STENOSIS IN PATIENTS OVER THE AGE OF FIFTY

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The past half-decade has witnessed a dramatic and hitherto unforeseen renaissance in the treatment of cardiac disease. The demonstration, in 1948, that the interior of the heart could be successfully invaded at will for the reconstruction of structural disorders marked a new era of surgical achievement. Surgery, almost from its inception, has had as one of its primary objectives the relief of "obstruction and stricture," no matter where the offending block lay within the systems of the human body. It was logical, therefore, that with the application of basic surgical principles to this new intracardiac field, initial attention and effort should be directed toward the relief of stenotic (obstruction and stricture) valvular disease.

Previous communications have reviewed the historical and developmental aspects of the events leading up to the present surgical treatment of mitral stenosis. These reports have also detailed the patho-physiologic considerations of this mitral valvular deformity and the technical aspects of its surgical correction have been outlined (1–15). It is, therefore, sufficient to state here that mitral commissurotomy is a procedure in which the individual anatomic leaflets of the stenotic mitral valve are surgically separated. By incising the angles or commissures of the mitral slit, a considerable degree of valve motion can be re-established without the production of additional significant mitral insufficiency. It is to be noted that no valve tissue is removed, thus allowing the liberated, although thickened and deformed valve leaflets to open during ventricular diastole and approximate during ventricular systole (FIG. 1).

The purpose of this publication is to present in considerable detail the data pertaining to our first twenty consecutive cases of commissurotomy for mitral stenosis in patients of fifty years and over. At first glance this would seem to represent a small number of patients when one considers that our over-all experience with this type of surgery now embraces over 400 cases. Admittedly, our early concepts as to the eventual scope of this program were immature, primarily from lack of experience in an essentially unprecedented field. It was assumed that statistically but few patients with severe structural mitral stenosis would live beyond the fifth and early sixth decades, and if they *were* so fortunate as to survive this length of time, secondary parenchymal fibrosis and vascular sclerosis in the lungs, liver, and possibly kidneys would preclude functional improvement even though the mechanically obstructed mitral valve be opened

Received for publication December 4, 1952.

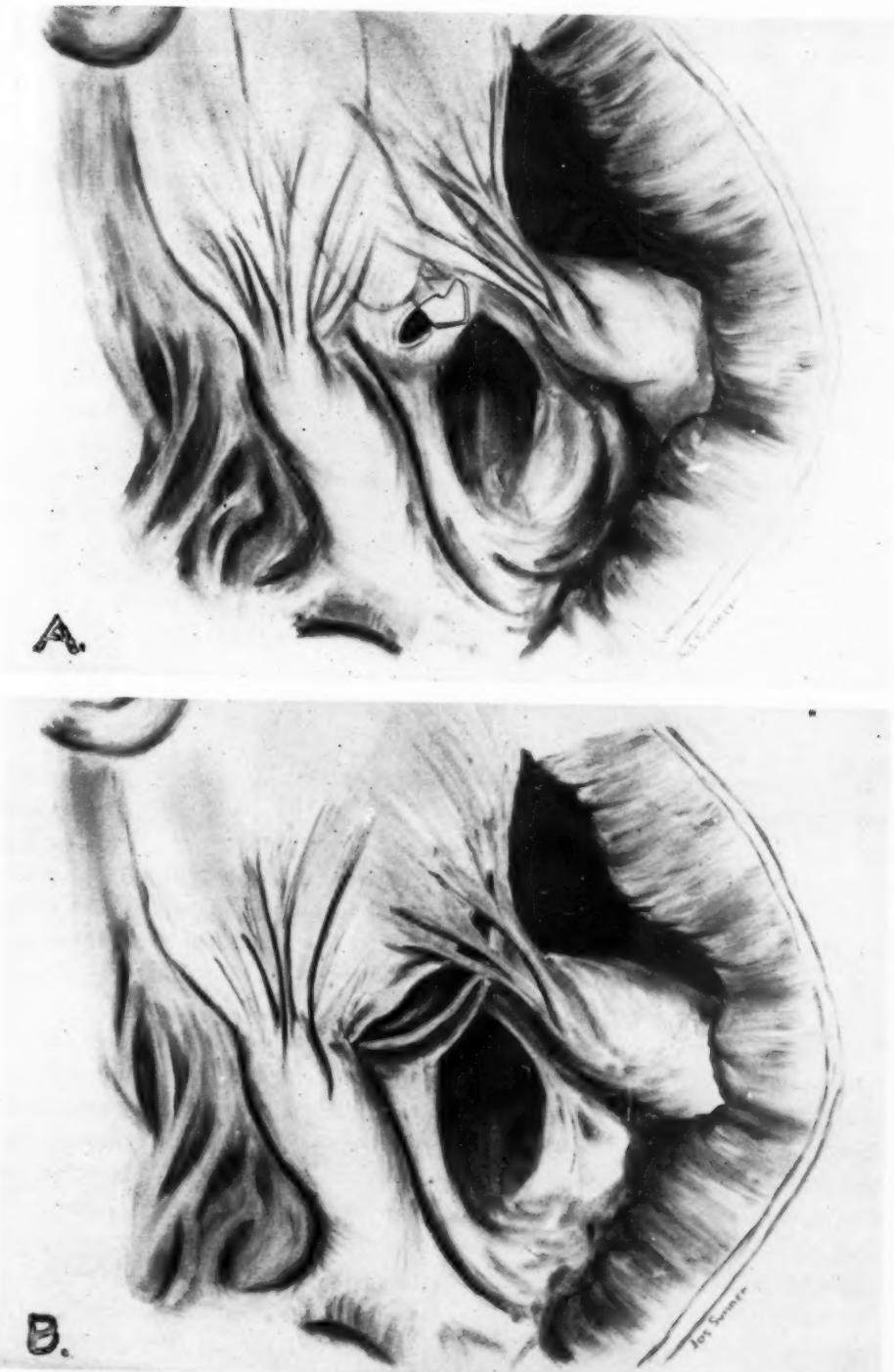

FIG. 1 (A) . . . Left ventricular view of the mitral valve cone in stenosis. The right index finger and Glover-Avery guillotine have been inserted through the left auricular appendage and properly placed for incision of the anterolateral commissure.

(B) . . . Valve orifice after commissurotomy. Note the intact chordae tendineae insuring partial restoration of valve function with prevention of significant mitral insufficiency.

to technical satisfaction. Subsequent events herein reported have proved this supposition to be in error.

Early in 1951, after observing that three-fourths of all patients in our series subjected to commissurotomy had obtained sustained improvement for the initial three-year postoperative observation period (many of these well over the age of forty), we thought it seemed altogether logical that these benefits be extended to older patients on a "trial and error" basis (16–20). This course seems reasonable when one appreciates the fact that chronological age does not necessarily parallel physiological age, as demonstrated over and over again in all branches of medicine and surgery. Our thinking had been blunted by the ever present misconception that a half century of life is so demanding as to render body tissues subjected to normal or pathological stress and strain incapable of recoil and restitution. Were this concept true, the older patient with benign prostatic hypertrophy, with biliary dyskinesia, with peptic ulcer dysfunction (all obstructing lesions) would indeed be doomed to an early demise without resort to surgical relief. Why then adopt such a philosophy in regard to the cardiovascular system, even though the offending barrier lies within a structure so vital as the heart? The obvious conclusion can be drawn: the heart responds physiologically in the same manner as all other organs and secondary phenomena are for the most part reversible—at least to the extent of an improved functional status.

ANALYSIS OF CASES

Twenty cases of mitral stenosis in patients aged fifty and over were treated by commissurotomy from May 4, 1951 to October 11, 1952. Of these, 11 were female and 9 were male. The oldest was a male aged sixty-one; there were also one each of ages fifty-seven and fifty-five, three of fifty-four, five of fifty-three, four of fifty-two, two of fifty-one and three of fifty. It goes almost without saying that all were seemingly far advanced in the course of their disease and represented the late or terminal stages of mitral stenosis. They have been grouped according to our previously published classification as shown in Table 1.

This classification has been prepared in an effort to combine a functional and therapeutic yardstick for evaluation of the patient for surgery. *Stage I* includes those with the auscultatory findings of mitral stenosis but who as yet have no symptoms. Cases in *Stage II* have progressed to the point where symptoms during physical activity have developed, but the patient living within his own limitations remains on an even plateau. *Stage III*, the largest group and one encompassing many variables includes, those who, despite the best medical therapy, are losing ground. *Stage IV*, terminally incapacitating, includes those patients in whom there is constant evidence of congestive failure even with limited physical activity. Most of these can be rendered relatively free of their accumulating tissue fluid only by the strictest of medical regimens. A certain small percentage of those in this group will ultimately prove *after surgery* to have been in *Stage V* and to have had irreversible changes. As yet, it has been impossible to separate routinely patients in these two stages by clinical and physiologic methods; hence,

we reserve *Stage V* to classify those who, despite a technically adequate commissurotomy, receive no ultimate or long-term improvement.

Status Prior to Admission (Table 2)

It is a surprising fact that not only in this limited group of patients but also in our over-all series of cases, fewer than 50 per cent of the patients can recall ever having had an attack of classical rheumatic fever. Apparently, either their rheumatic fever was masked by some other concomitant condition, called by another name and simply not recognized as such, or it was present in a subclinical state. In only 8 of these 20 cases was there a definite history of rheumatic fever. In 7 of these the initial infection occurred in childhood and in the remaining

TABLE 1

Stages of Mitral Stenosis

	Cases	Operative Mortality	Late Deaths
I. Asymptomatic	0	0	0
II. Statically incapacitating	0	0	0
III. Progressively incapacitating	16	0	0
IV. Terminally incapacitating	2	0	0
V. Irreversible	2	0	2 (over 6 months)
Total	20	0	2 (10%)

TABLE 2

Status Prior to Admission

History of rheumatic infection	8 (40%)
Progressive dyspnea and fatigue	20 (100%)
Hemoptysis	3 (15%)
Systemic embolism	5 (25%)

case at 21. In this respect the time interval between onset of disease and date of surgery was considerably longer than that which elapsed in the majority of our patients, whose average age at the time of surgery was thirty-five.

Progressive dyspnea and fatigue were present in varying degree in each of the twenty cases. In addition to this evidence of cardio-pulmonary disability, all but 2 patients had on one or more occasions experienced some manifestation of right heart (congestive) failure. Only 3 had had one or more episodes of frank hemoptysis, although the majority had expectorated pink-stained frothy material during major or minor bouts of pulmonary edema.

In five patients (25 per cent) cerebral, visceral or peripheral emboli had occurred on one or more occasions. All of these presented easily recognizable residuals of their embolic experiences. Each of these patients had auricular fibrillation at the time of the vascular catastrophe. It is of interest that four of these five (80 per cent) had thrombotic material in the left auricular appendage at

the time of surgery, but in one the endocardial lining was clean and smooth. In none of these cases have there been recurrent embolic episodes, either during or since surgical intervention, as will be amplified later. It has been previously emphasized that ligation of the base of the left auricular appendage, together with the relief of left atrial stasis resulting from adequate valvular reconstruction, has no doubt been responsible for this gratifying effect.

Status Upon Admission (Table 3)

Pure mitral stenosis was the clinical and auscultatory diagnosis in eleven (55 per cent) cases. There was an associated minimal mitral insufficiency present in 8 (35 per cent) others and an additional suggestion of minimal aortic insufficiency in the remaining case. Minimal left ventricular enlargement was present in this latter case and also in one of the group in which mitral stenosis and insufficiency was recognized (10 per cent). All of these clinical impressions were specifically confirmed at the time of surgery, for in each of those cases with insufficiency

TABLE 3

Status Upon Admission

Pure mitral stenosis (auscultatory and operative finding)	11	(55%)
Mitral stenosis with associated minimal mitral insufficiency (auscultatory and operative finding)	8	(35%)
Mitral stenosis with associated minimal mitral insufficiency and aortic insufficiency (auscultatory and operative finding)	1	(5%)
Auricular fibrillation	12	(60%)
Left ventricular enlargement (minimal)	2	(10%)

a tiny regurgitant jet could be felt during ventricular systole by the exploring finger placed just proximal to the contracted mitral orifice during this phase of the cardiac cycle.

Auricular fibrillation was permanently present in 12 instances (60 per cent). Contrary to initial speculative conjecture, an arrhythmia of this type is *not* a contraindication to surgery. The eventual results in this group have compared quite favorably from a functional standpoint with the results in those who still had normal sinus rhythm, although perhaps definitive objective studies, if available, might reveal a somewhat diminished cardiac reserve.

One third of these patients presented themselves in various stages of pulmonary and/or congestive failure of the chronic type. Intensive preoperative dehydration rendered all but three of these free from clinical evidence of such congestion. In these three there remained varying degrees of hepatomegaly irreducible by medical measures which had successfully cleared other tissue reservoirs of excess fluid. Only one of these three obtained a satisfactory response to surgery, the other two eventually succumbing as a result of irreversible cardiopulmonary and hepatic parenchymal changes.

It is to be noted that a right axis deviation (plus 90° or more) or a normal axis was present in all cases. Of greater importance from the standpoint of

selection of cases for surgery, however, is the fact that no case showed evidence of left ventricular preponderance or combination with strain pattern. Presence of the latter findings is strong presumptive evidence that factors other than predominant mitral stenosis are present, and benefit from surgical intervention is questionable.

Early in the course of our intracardiac surgical program, candidates for mitral commissurotomy were routinely subjected to cardiac catheterization. The data regarding the elevated pulmonary vascular pressures seen in mitral stenosis, together with the immediate and late effects observed after surgery, have been published elsewhere. We have long since abandoned this form of study as a routine practice except when doubt exists as to the actual diagnosis or the presence of additional complicating factors. Hence, no such data are available in this series. Two of the patients were catheterized preoperatively, showing the typical and expected pulmonary hypertension, but as yet they have not been subjected to postoperative study of this type.

Operative Findings (Table 4)

The size of the mitral valve orifice, as estimated by the tip of the exploring index finger, in 17 of the cases was less than one cm. in diameter (two paper match heads); in 3, slightly larger. The cusp margins were thickened, rolled and fibrotic with fixation of the peri-orificial ring. In addition to the firm and indurated cusp margins, the valve leaflets themselves were of the consistency of heavy shoe leather. Fifteen of the valves retained some flexibility, although this was minimal. In 5, all semblance of a functioning valve was lost in that the valvular diaphragm was completely fixed and rigid. Extreme fibrosis and calcium replacement was responsible for this effect.

Calcification was present in 13 of the 20 valves (65 per cent). In 5 of these, as mentioned above, it was excessive and accounted for complete fixation of the leaflets. The remaining 8 varied from tiny calcific beads along the cusp margin to complete encirclement of the valve orifice with extension back into leaflet tissue itself. The frequent site for such infiltration was on the anterior (aortic) leaflet over its medial aspect—that portion nearest the outflow tract of the left ventricle.

It was possible, despite the advanced nature of the valvular pathology, to accomplish a highly satisfactory separation of the valve leaflets in 12 cases (3.0 to 4.0 cm., or 2 fingers). In 7 others the opening actually was equally satisfactory from the functional standpoint, although the mitral slit could be enlarged only to 2.5 cm. (one and one-half fingers). In another case the slit was opened to 1.5 to 2.0 cm. (one finger). In none of the patients was a clinically significant insufficiency (more than grade 1 to 2) produced, even in those who had minimal insufficiency prior to commissurotomy.

Of considerable interest is the relationship between auricular fibrillation, thrombosis in the left atrium and appendage, and embolism. Twelve of the 20 patients (60 per cent) had permanent auricular fibrillation. Five of these had a history of arterial embolism, and a thrombus was found in the left auricular

appendage or atrium in four. An additional 5 patients had thrombi in the appendage without history of emboli. Thus, 9 patients (45 per cent of the total) were found to have thrombi in the left heart. Two patients awoke from anesthesia with a left hemiplegia and a third with pain in the left leg. Neither of the first 2 was in the group having had emboli in the past, and in neither was there thrombotic material in the appendage. Both, however, had flecks of calcium on their valves which seemed to be the source of their emboli. Both made satisfactory recoveries. These data may be surprising in view of the fact that the valvular surgery in each instance was carried out directly through the thrombosed appendage without the production of emboli from this site. This is in keeping with our experience in the entire group of over 400 cases.

In the third patient, in whom the appendage was obliterated by thrombus, pain developed in the popliteal area of the left leg shortly after surgery. This patient had had innumerable emboli to the brain, viscera and extremities in

TABLE 4

Operative Findings

	Number	Percentage
Size of mitral orifice (before commissurotomy)		
0.8 cm. × 0.5 cm. or less (critical)	17	85
1 cm. × 0.5 cm. or more	3	15
Size of mitral orifice (after commissurotomy)		
3.0–4.0 cm.	12	60
2.5 cm.	7	35
1.5–2.0 cm.	1	5
Valvular calcification	13	65
Thrombus in left atrium	9	45
Enlargement of left ventricle	2	10
Systolic regurgitant jet	9	45

the past, had undergone an attempted embolectomy in the right femoral artery several years before, and had been taking dicumarol for many months prior to admission. Bilateral intermittent claudication had been present for a long time. A therapeutic caudal block was continued for two days without noticeable effect as the left leg became more and more discolored with signs of demarcation below the knee. The right foot was only slightly cyanotic, non-painful and maintained unlimited function. Left femoral artery exploration revealed a good but not pulsatile flow of blood and no embolus could be located, either above or below from the aortic bifurcation to the popliteal artery. Eventually, a left midthigh amputation was necessary, from which the patient made a fine recovery. Extensive search of the vascular tree in the amputated limb failed to discover fresh embolic material, although all vessels were thickened and contracted as in thromboangiitis obliterans.

Present Functional Status

There is no task more difficult in the compilation of clinical data than to reach agreement on suitable and self-explanatory criteria for the evaluation of

surgical results. This is especially true when the patho-physiologic pattern of a disease entity, such as mitral stenosis, is so varied. The common ground for comparison would seem to be the functional state of the patient at least six months or more after surgery.

Table 5 summarizes the results as obtained in this series. Admittedly, the period of observation as yet is short. However, as the early postoperative course in this group has followed the same pattern as that already observed over a four-year period in our entire series, there is every reason to believe that here, too, the eventual results will be comparable. Six patients are classified as *excellent*, in that they have been restored to a normal, productive life, enjoying normal activities without obvious cardiac limitation. Restriction of diet (salt) and mercurial diuretics are no longer necessary. Because of the more advanced ages of these patients all have been continued on a small maintenance dose of digitalis for the first year as a precautionary measure. Nine are considered to be objectively and subjectively *improved*, as evidenced by their return to almost

TABLE 5

Present Functional Status—20 cases

	Number	Percent	
1. Excellent	6	30	75
2. Improved	9	45	
3. Unimproved	3	15	
4. Deaths (both *Stage V*):			
(a) Operative	0	0	
(b) Late	2	10	
Total	20	100	

normal life and activity within their own particular limitations, determined on a "trial and error" basis. The range of improvement in this group varies widely with the condition of the valve found at surgery and the degree to which valve function could be restored. Their progressive downhill course has been abruptly terminated or reversed, some to gain a high level of efficiency and others to remain on an improved plateau.

Three have been essentially *unimproved*. One of these had a significant degree of mitral insufficiency, the seriousness of which was appreciated only at the time of valve exploration. The valve of another was so rigid and unyielding that an adequate separation of the valve leaflets could not be effected. The third should have obtained a satisfactory result, based on the condition of her valve, but her refusal to remain under the care of her physician has delayed, perhaps permanently, any beneficial response.

The remaining two patients died six months and one year after surgery. Both were in terminal, uncontrollable failure at the time of surgery. Each, after a short period of apparent improvement, slipped into his previous state. Irreversible cardio-pulmonary and hepatic parenchymal changes were essentially unaffected even though a technically adequate commissurotomy was accomplished.

DISCUSSION

Why is it that a certain number of patients with mitral stenosis are relatively asymptomatic until late in life? The answer to this difficult question is no doubt manifold. In all probability the original rheumatic valvulitis occurring in childhood was sufficiently mild to produce in itself only a moderate decrease in the lumen of the mitral orifice. Although such a patient may well have the typical auscultatory mitral diastolic rumble, he may also be completely free of symptoms for many years. If this be true it must be assumed that there is a "critical point" of constriction of the mitral orifice which must be reached and maintained before the characteristic symptoms of mitral stenosis develop. Strikingly, we have observed, in over 400 patients, the same small orificial constriction in patients with mild symptoms as in those with marked symptoms. This would suggest that once the "critical point of constriction" has been reached (in our opinion, an orifice roughly 1 cm. by 0.5 cm.), the left atrium, pulmonary bed and right heart can no longer silently cope with, or compensate for, the mechanical barrier with which they are faced. At this point symptoms arise and the endless chain of events which follows (dyspnea, hemoptysis, pulmonary edema, auricular fibrillation, congestive failure, emboli, etc.) becomes recognizable. Should this constriction proceed to critical levels at an early age (25 to 40), the onset of progressive symptoms heralds the date for surgical intervention then and there. In a few, however, it would seem that valvular constriction remains stationary, just short of the critical point, for an indefinite period. Eventually, the constant stress and strain of blood passing through narrowed and damaged valve cusps leads to deposition of fibrin and platelets upon the leaflets, chordae tendineae and papillary muscles. In consequence, thickening, contraction, deposition of calcium with bizarre distortion further decrease the lumen. The critical level is reached and symptoms ensue but, of course, in this instance the entire process has consumed many more years than in the average case. The therapeutic conclusions must be obvious in the older age group just as they were in the younger. The patient with mitral stenosis who has symptoms occurring late in life is considered in the light of his pathological rather than his chronological age. Although the valve may be tougher, more leathery and unyielding, and contain a bit more calcium in some instances, if it is opened early in the course of its expressed symptoms, results comparable to those in the younger age group may still be obtainable.

SUMMARY AND CONCLUSIONS

Although results obtained in this small series of twenty older-age patients may not be conclusive in themselves, when compared to our experience with 400 similar, though younger, patients, certain deductions may safely be drawn:

1. Patients over the age of 50 can safely withstand intracardiac manipulation of the type carried out in the performance of mitral commissurotomy.
2. The morbidity and the operative mortality are no greater than those noted in younger individuals.
3. The results are as good as those obtained in patients operated upon in the third and fourth decades.

4. Successful surgery is dependent upon the same factors that apply in the younger age group, namely, operative intervention as soon as there is a progressive symptomatic downhill course, before the complications such as auricular fibrillation, marked cardiac enlargement, repeated episodes of congestive failure occur.

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THE MANAGEMENT OF ANGINA PECTORIS*

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Angina pectoris is not a disease; it is a symptom complex generally considered to be due to an imbalance between coronary arterial blood flow and myocardial demand for oxygenated blood. The syndrome is usually due to a decrease in caliber or partial closure of the lumen of a coronary artery, caused by arteriosclerotic processes such as thrombosis and intramural hemorrhage, or by non-arteriosclerotic changes such as inflammation, embolism or infection. Arteriosclerosis accounts for almost 92 per cent of the serious obstructions of the coronary arteries (1).

The treatment of the anginal syndrome must be predicated on a correct diagnosis. It is not our purpose here to discuss the latter in detail, but it should be stressed that the diagnosis rests almost entirely on the history and, to a lesser extent, upon an abnormal response of the electrocardiogram to stressful situations. A normal electrocardiogram at rest is not unusual in these patients. Wood *et al.* (3) have recently reported a series of 100 patients with unequivocal angina pectoris whose electrocardiograms at rest were normal, but in 88 per cent of whom abnormalities developed following maximal effort. The response of the electrocardiogram to calibrated exercise (4) or relative anoxia (5) has been very helpful to us in making the diagnosis. The immediate administration of nitroglycerine following the development of pain during the testing procedure minimizes any dangerous sequelae to the patient. Studies from this laboratory (6) have been reported in which the persistence or disappearance of such induced electrocardiographic abnormalities was utilized as an aid in evaluating the effect of drugs on the anginal syndrome.

There are two objectives in the treatment of angina pectoris: 1) the treatment of the individual attack of pain, in order to terminate it as rapidly as possible, and 2) prophylaxis in an attempt to alter the disease process in such a way as to reduce the frequency and severity of the attacks. The principles herein outlined have been useful in the management of angina pectoris in patients seen in the Cardiac Clinic of a large general hospital.

GENERAL MANAGEMENT OF THE PATIENT

Explanation to the Patient

The term "angina pectoris" is well known to the average person, to whom it is often synonymous with impending or sudden death. It is often very difficult to restore self-confidence and to develop the ability to "live with his illness,"

* These studies were aided in part by a grant from National Drug Company, Philadelphia, Pa., and in part by a grant from the Kentucky State Medical Research Commission.

Received for publication December 16, 1952.

once the patient has heard the term applied to it. We refer to the syndrome as "coronary insufficiency" when discussing the process with him.

A useful form of explanation to the patient is to liken the pain of coronary insufficiency to a caution light which, when heeded, may be an effective warning and so prevent more serious trouble such as myocardial infarction. Once he understands the significance of his pain, his acceptance of it as a warning symptom and not as a disease in itself, will do much to eliminate the terror-stricken attitude with which, quite naturally, he has heretofore regarded it. Sympathetic explanation by the physician will do much to prevent a cardiac neurosis and unnecessary cardiac invalidism.

Correction of Associated Diseases

Since angina pectoris is induced by ischemia of the heart muscle, it may occur in patients in whom the coronary arteries may be free of atheroma. Common examples of this state are severe anemia, hyperthyroidism, paroxysmal tachycardia, and congestive failure in non-atheromatous hearts. Treatment of the underlying condition may often result in cessation of the anginal syndrome or marked reduction in symptoms when coronary artery disease is coexistent.

Diet

Coronary artery disease is frequently found in those patients who are florid, robust, and obese. Death rates from angina pectoris among overweight patients are double those among persons of normal weight (7). Autopsy studies show that arteriosclerosis is twice as common in the obese as in persons who are poorly nourished; this relationship is independent of age, sex, and hypertension (8). The importance of a diet sufficient to maintain a "low normal" weight should be stressed to all patients with coronary artery disease.

A close relationship apparently exists between arteriosclerosis and elevated serum cholesterol levels. It would seem important to reduce both cholesterol and total fat intake in order to reduce the serum cholesterol (9); however Hildreth *et al.* (10) have shown that restriction of total fat reduces the serum cholesterol concentration even when the amount of cholesterol in the diet is normal. Nevertheless there is not general agreement on this point, as evidenced by the finding by Gofman *et al.* (11) of a low correlation between the extent of atherosclerosis and the serum cholesterol levels. They regard as a more important index the response of the serum molecules to ultracentrifugation, the S_f 12–100 molecules being considered of greatest significance in the development of atherosclerosis. Pending further clarification of the genesis of atherosclerosis, it would still seem desirable to recommend a low caloric, low fat diet.

Exercise

Exercise is permitted to limits of tolerance as manifested by the occurrence of chest discomfort. The patient is advised not to exercise immediately following a large meal or when exposed to severe cold. It has been frequently observed that exertion involving the use of the arms is poorly tolerated as compared to

walking, and that the patient usually has greatest exercise tolerance when walking with congenial companions on level ground. He is advised never to attempt to "walk off" chest discomfort.

Daily Diary

All of our patients keep a small notebook in which they record the circumstances resulting in each anginal attack and the number of attacks each day. Often slight changes in daily routine, living quarters, or prevention of unpleasant emotional contacts will greatly reduce their frequency. Certain circumstances obviously cannot be favorably altered.

THE DRUG TREATMENT OF ANGINA PECTORIS

Vasodilator Drugs

1. Nitroglycerine. Nitroglycerine is the most useful drug in the treatment of the anginal syndrome. It is possible to minimize the pounding of the heart and headache incident to its use by taking the smallest effective dose. In many patients 1/200 grain of nitroglycerine sublingually results in prompt relief of pain without unpleasant side effects.

Nitroglycerine is very effective as a preventive measure. The taking of a tablet prior to exposure to situations which experience has shown may be expected to result in coronary insufficiency, often will result in a marked increase in exercise tolerance, thereby permitting certain activities to be undertaken without discomfort which otherwise would not have been possible. The daily diary is helpful as an aid in predicting these stressful situations.

In certain patients, nitroglycerine results in improvement in exercise tolerance when taken in small doses at frequent intervals throughout the day. This plan is worthy of trial in patients with severe angina, since side effects are not severe and the drug is safe to use.

2. Khellin. Khellin is a vasodilator drug derived from the fruit of the Mediterranean plant, Amni Visnaga. The drug is used as a maintenance medication to aid in the prevention of attacks of angina, and may also be useful in preventing cardiac asthma. The data are conflicting as to its efficacy (12, 13, 14, 15). In our experience it is very useful in a small percentage of patients. In responsive patients, objective as well as subjective evidence indicates a definite decrease in the frequency of attacks, an increase in work capacity and a lessening of myocardial ischemia as indicated by the results of electrocardiographic tests.

A major difficulty in the evaluation of Khellin has been the high incidence of toxic side effects, particularly nausea, vomiting, and diarrhea. Data (6) from this laboratory have suggested an optimum oral dosage of 30 to 60 mg. per day. This relatively small dose results in a marked decrease in side effects, while the drug remains effective in certain patients. Further investigations as yet unpublished suggest the use of a dosage plan utilizing both the oral and intramuscular routes at the same time. Fig. 1 shows data typical of a small group of patients who could tolerate Khellin intramuscularly when nausea followed an identical oral dose. We have also noted an increased tolerance to its gastric irritant effects

when it is ingested in conjunction with a suspension of polyamine methylene resin and sodium aluminum silicate (Resion®). These methods of administration may permit the use of Khellin in patients otherwise intolerant to it.

3. Pentaerythritol Tetranitrate (*Peritrate®*). Peritrate (20–23) differs from previously available nitrate compounds in the lack of drug tolerance incident to its use in patients with angina pectoris. It is a long-acting nitrate usually used

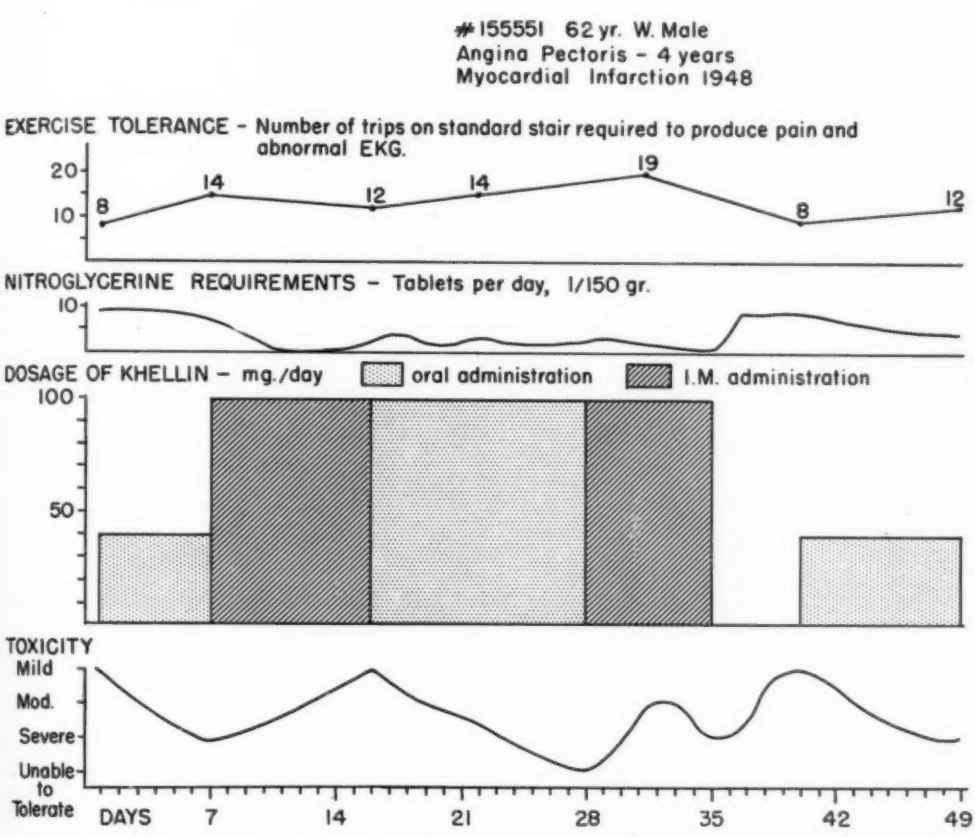

FIG. 1. A 62 year old white male with arteriosclerotic heart disease and severe angina pectoris. This patient could tolerate the intramuscular administration of Khellin subsequent to the development of symptoms of gastric irritation on oral Khellin. The onset of toxic symptoms secondary to Khellin therapy may be delayed but rarely eliminated by the use of the intramuscular mode of administration.

in a dosage of 40 mg. per day in divided doses. The drug is not effective in all cases of angina but has a definite advantage over Khellin in the lower incidence of its toxic side effects. Its mechanism of action is presumably vasodilation related to the liberation of nitrites.

4. Dioxylline Phosphate (*Paveril®*). Paveril is a synthetic papaverine-like drug which is classified as non-narcotic. The drug is used in a dosage of 1.2 grams per day in divided doses. Vasospasm may be reduced by the use of this drug and it may be useful in certain patients with angina (16). Side effects are infrequently encountered.

Other Drugs

1. Heparin. Gofman and his co-workers (17) have shown that a single intravenous injection of 100 mg. of sodium heparin produces dramatic changes in the lipoprotein spectrum. They also describe marked relief of the symptoms of angina pectoris in 55 out of 59 patients treated with 50 to 100 mg. of intravenous or intramuscular sodium heparin per week without other medication. The mechanism of its action is unknown but it is presumably not related to any vasodilator or antithrombotic effect.

2. Radioactive Iodine (I^{131}). Radioactive iodine has been used to induce myxedema in patients with angina in order to reduce cardiac work. The total oral dose suggested by Blumgart and co-workers (18) averaged 61.0 millicuries. In the event that severe symptoms of myxedema ensue, thyroid substance is given in amounts sufficient to relieve the discomfort of myxedema and yet retain relief of cardiac symptoms.

We have had no personal experience with this drug but it would seem advisable to reserve judgment until further experience has been accumulated. The possibility that the state of hypercholesteremia which is induced may have an aggravating effect on the atherosclerotic process involving the coronary vessels would suggest caution in its use in patients in the younger age groups. It should be noted, however, that this method of inducing myxedema would appear to be easier and safer than with propylthiouracil or total thyroidectomy.

3. Sedatives. Phenobarbital in doses of 15 to 30 mg. three or four times a day is helpful in unstable, emotionally labile patients. It may be used for long periods of time and rarely results in serious toxic effects. Alcohol is probably effective as a sedative rather than as a vasodilator.

Other Drugs Rarely Useful

Aminophylline, theobromine, papaverine, sex hormones, erythrol tetranitrate and mannitol hexaditrate may prove useful in rare instances. However, in our experience they are unreliable and may be accompanied by unpleasant side effects. We do not use them in our clinic patients.

Surgery

Pain pathways may be interrupted by injection of the posterior root ganglia T_1 to T_6 with 95 per cent alcohol, by posterior root section of T_1 to T_5, or by upper thoracic sympathetic ganglionectomy. Pain is usually abolished by such procedures but sufficient discomfort remains to warn against overtaxation of the heart. Beck (19) has recently reported on revascularization of the heart by grafting a systemic artery to the coronary sinus.

We reserve surgery for those patients unresponsive to more conservative means of therapy, since any surgical procedure is dangerous in this group of patients. Upper thoracic sympathetic ganglionectomy has proven very useful in a patient with *angina decubitus* due to syphilitic disease of the coronary ostia.

SUMMARY

Much can be done to improve the mental and physical state of patients with coronary artery insufficiency. Methods we have found useful may be summarized as follows:

1. Explanation to the patients of the significance and usefulness of warning chest discomfort.
2. Diet low in calories, cholesterol, and total fat.
3. Use of a daily diary with the aim of first recognizing, then preventing stressful situations.
4. Mild sedation as indicated.
5. Nitroglycerine as a prophylactic agent as well as a means of treating the acute episode.
6. Use of a vasodilator drug as a means of preventing attacks. The most effective drugs in our experience are Khellin, Peritrate, and occasionally Paveril. Patient response relative to effectiveness and toxicity of these drugs varies greatly. A trial test with each drug, to facilitate the selection of the most effective and the best tolerated compound, is suggested.
7. Further studies on heparin or a heparin-like compound may prove it to be useful in the treatment of angina pectoris.
8. Evaluation of I^{131} must await further experience.
9. Surgery should be used only when the pain is obviously intractable to medical management and is incapacitating.

The authors wish to express appreciation to Senior Student Charles McGaff who aided in the electrocardiographic evaluation of many of the drugs described in this report.

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MYOCARDIAL INFARCTION IN THE AGED[1]

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The study of certain disease entities is approached with the knowledge that age will affect the expected clinical data, prognoses and management. Diabetes, tuberculosis and syphilis are three good examples of such a group of disorders. It is the purpose of this paper to determine whether myocardial infarction presents any distinctive features and problems peculiar to the elderly individual. Statistics comparing clinical and pathological findings of this lesion in the younger and aged groups are rather rare in the literature.

Two fairly comprehensive surveys (1, 2) of this problem have been published, and have helped in our study in explaining any peculiarities that may be associated with age.

Before a clinical analysis is made of these surveys, the question of the coronary circulation in the aged should be considered. Does it differ from that of the younger? Apparently, the age of the person has no significant effect upon the coronary circulation other than the increasing pathology that occurs with age (3). The changes that are found in the older age group result primarily from the increased coronary obstruction, and not from age itself. Collateral circulation is a response to ischemia. An aged individual may have a normal coronary tree.

In a reported series (1) of 500 patients with occlusion of the coronary arteries, 35.5 per cent were 60 years of age or above. This is probably a more representative figure than that of the second study (2) of 950 autopsied males with coronary disease, taken from the Armed Forces Institute of Pathology. In this investigation only 12 per cent were over 60, but the population concerned was a much younger one.

As generally noted, men are much more susceptible than women to coronary occlusion. In the first study (1), the ratio is 3.4 to 1, which is somewhat lower than other figures reported in the literature, but with increased age there is definite redistribution with respect to sex. Women are known to suffer coronary occlusion later than men, and this is brought out in the first study analyzed (1). Of women stricken with coronary occlusion, 43.5 per cent were 60 or over, whereas only 33.6 of the men were in this age group. The peak incidence among women in this series occurred between the ages of 55 to 59, as compared with 50 to 54 for men.

Strenuous activity is occasionally associated with the development of an acute coronary insult. How great a factor this may be is a guess rather than a scientific conclusion. In the second study (2), 14.0 per cent of the men over 40 were en-

Received for publication July 28, 1952.

[1] Read at the Annual Meeting of the American Geriatrics Society, Chicago, Illinois, June 6, 1952.

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gaged in strenuous activity prior to the onset of their initial attack. In another series (4), only 2.0 per cent of coronary occlusions were associated with unusual effort. Much larger percentages of strenuous activity as a precipitating factor were found in young men of military age. The younger groups are much more likely to be engaged in such activity.

Hypertension has always been associated with coronary artery disease. The first study (1) cited presents an over-all percentage of 62.4 with hypertension, using as a baseline a blood pressure reading with a systolic of 150 and a diastolic of 90. In men the incidence rose from 28.0 per cent in the group aged 25 to 34 to 80.0 per cent in the group aged 60 to 75; 56.5 per cent of all men and 88.3 of all women had hypertension.

Diabetes, as well as hypertension, was found to be more common in the older patients: the incidence was 17.0 per cent in those aged 60 and over, but only 4.8 per cent in those under 50. Diabetes was four times as frequent in women with coronary disease as in men. The conclusion is drawn that in those under 50 diabetes was not a factor in coronary occlusion, but that it played a definite role in women over 50.

Obesity as a predisposing factor in coronary disease is brought out by the figures of the second series (2), which revealed that 33.0 per cent of men over 50 were greatly overweight. In the group aged 18 to 29, 15.0 per cent were greatly overweight; in the 30–39 and 40–49 age groups the statistics were 23.0 and 29.0 per cent, respectively.

Thorough search for a history of cardiac disease will, in most patients in the middle and older age groups, bring more positive evidence. In the second study (2), 48.0 per cent of the group aged 18 to 39 had no previous history suggesting cardiac disease, but in the group aged 40 or over all but 10.0 per cent gave some information of previous cardiac trouble. Once a previous history of cardiac disease was obtained, the younger men showed the same incidence of occurrence of coronary insufficiency as the older men.

However, the older patient is more prone to dyspnea and congestive failure, and is more likely to have a history of a previous infarction.

Pain is an outstanding symptom in the younger individual. A 98.0 per cent occurrence of pain was reported (2) in the group aged 18 to 29, which gradually fell to 84.0 per cent in the group aged 50 and over. There was no significant distribution of pain in comparing the older and younger groups.

In the first survey cited (1), the incidence of congestive failure rose with age the figures showed about 100.0 per cent increase in the group over 60, as compared with the group aged 27 to 29. Cardiac enlargement showed about the same proportional increase with age as did congestive failure.

In the second group (2), the only cardiac sign that varied significantly with age was gallop rhythm, which revealed a definite decrease with increasing age.

The mortality rate increased with age. The first series (1) varied from 15.4 per cent mortality in the fourth decade to 42.0 per cent in the seventh decade. In the fourth decade the non-fatal attacks were double the fatal attacks; the reverse was true in the seventh decade.

On pathological examination coronary disease is more likely to be confined to one or two arteries in the younger group. This can partly account for the better prognosis in the more youthful patients. Other factors are the widespread arteriosclerosis and the presence of other diseases in the older patients.

Whereas congestive failure is generally the most common cause of death in coronary thrombosis—a 50.0 per cent incidence in one series (5)—it takes second place in patients under 50, the group in whom arterial embolism, either peripheral or pulmonary, has been found to be the most common. As a cause of death, an incidence of arterial embolism of 53.0 per cent was found in patients under 50 as compared with only 12.0 per cent in patients of 50 or more.

In reviewing the histories of patients over 65 with myocardial infarction observed in private practice, and in a Veterans Administration Hospital[3], where one of us is associated, we gained certain impressions which agree in part with those of previous authors. No attempt has been made to evaluate statistically our observations on this series of elderly persons with myocardial infarction, as the numerical total was too small.

Among possible etiological factors of importance is an episode of major surgery. The wear and tear of an operative procedure, plus the administration of a general anesthetic, with the lowering of blood pressure, may bring about an acute myocardial insult in a heart already incapacitated by an insufficient coronary circulation. It has been shown (6) that shock, no matter how it is produced, may lead to the development, not only of a single, but often of multiple fresh coronary occlusions in the elderly patient, particularly those showing evidence of coronary arteriosclerosis.

As might be expected with this age group, a history of strenuous activity played no part. Hypertension as a possible etiological and associated factor was not a prevalent finding.

Of particular significance in these older patients is the striking tendency of the pain pattern to differ from that of the classical concept. In many of our older patients, with electrocardiographic and/or pathological findings of myocardial infarction, there was no history of a pain syndrome. It was not uncommon to have a patient on two subsequent hospital stays of a few months appear to present a positive electrocardiographic pattern on his second hospital admission, without any symptoms of such an occurrence during the hospital-free interval. When pain was present, it was likely often to present an atypical picture. One patient described the onset of sudden pain in the right arm radiating across the chest to the left arm. Another gave a picture of substernal distress radiating to the right shoulder with numbness of the entire inner aspect of the right arm.

A type of pain pattern not often seen in the younger groups was that of repeated, mild attacks of coronary insufficiency over a period of time without any one single devastating episode. Electrocardiograms established diagnoses of myocardial infarctions which undoubtedly took place somewhere along the line of these recurrent anginal attacks. The impression gained was that when pain

[3] Veterans Administration Hospital, Kingsbridge, N. Y.

was present, both the severity and duration were generally less than in the more youthful victims. One patient's episode of pain, later confirmed by the electrocardiographic tracing, lasted only ten minutes. Of considerable interest is the fact that the intensity and duration of the pain appeared to have no direct relationship to ultimate mortality. Also absent in the histories of our elderly patients was the comment so often made by the younger men, "I thought I had an attack of indigestion." Nausea and vomiting were marked by their absence.

Coinciding with the comparative mildness of the pain, in contrast with this symptom in younger patients, was the relative absence of the picture of shock. We have been struck by the almost ever-present syndrome of overwhelming shock and pain in the youthful victim of myocardial infarction. This phenomenon played little part in our elderly patient, even when the pain was described as severe.

A common incident on admission in our patients over 65 was a complaint referable to some past congestive failure. Dyspnea was the most prevalent symptom in this latter group. Investigation brought out the past occurrence of single or multiple infarctions. The more youthful patient rarely offers an episode of failure as his presenting complaint. It was observed that the elderly, compensated patient suffering from a myocardial infarction was much more likely to be precipitated into a state of decompensation. It is this factor of cardiac failure which is in most cases the direct cause of a fatal outcome in the older person.

Elevation of temperature, leucocytosis, elevation of the sedimentation rate, all evidence of myocardial damage, are generally less striking in the older patient. An enlarged heart was present in most cases.

No distinctive features in regard to heart sounds, murmurs, gallop rhythm, pericardial friction rub, or fall in blood pressure, were observed.

As would be expected, the discovery of multiple infarcts was frequent in our aged patients; it may be assumed that their presence was a contributory factor to the great incidence of congestive failure.

In summary, we may present an elderly patient suffering a coronary occlusion as one who gives a history of moderate pain of limited duration, preceded by some evidence of congestive failure, who may or may not have had a previous history of hypertension, and who on admission fails to present a shocklike picture. Fever and leucocytosis, while present, do not show the increased heights noted in the more youthful sufferer. Physical examination will reveal an enlarged heart, and some signs of congestive failure. The presence of this latter state may well end the patient's ultimate demise.

Our study also indicated that long survival may occur in the aged who have suffered a myocardial infarction. Age itself is no contraindication to longevity following myocardial infarction (7).

Rupture of the heart, in our experience, did not seem to be more common following myocardial infarction in the aged individual.

A comparison of young and elderly patients suffering from myocardial infarction emphasizes certain details in the treatment and management of the

elderly patient. Regardless of age, all of the classical methods of treatment should be employed in management. It is only with respect to details that the treatment should vary. These details frequently concern themselves with congestive heart failure, so often present in the aged individual with myocardial infarction.

Although all the common drugs are used, certain precautions are necessary in their use in the aged. The aged patient in congestive failure needs digitalis when a recent myocardial incident has occurred. Digitalis should be used more cautiously, and a slow method of inducing the drug effect is safer (8). The ischemic myocardium is known to be hyperirritable. One of the rapidly excreted glucosides may be a useful agent in the elderly when the danger of toxicity is increased.

Diuretics, when employed in the aged male, present certain definite problems. In administering diuretics to elderly persons it is very important to avoid excessive diuresis, salt depletion, dehydration, and azotemia (9). The smaller dose prevails, and 1 cc. of Mercuhydrin should be given intramuscularly, not more than every other day. We have noted, with others (10), that in elderly men mercurials can aggravate prostatic disease, causing acute retention and severe uremia.

We cannot help but emphasize again the danger inherent in the excessive use of sedatives in the aged individual. It has been repeatedly stated that elderly persons are very sensitive to barbiturate drugs, which must be used with extreme care. This is true of sedation in general in the aged (11).

Our impression regarding the use of anticoagulants in elderly patients is that, as with other drugs, the dosage in general should be smaller, and that the prothrombin time must be watched with particular care. We might state that it has not been conclusively determined whether anticoagulants should be used in very elderly patients with myocardial infarction. Recent studies (12) seem to indicate that a "good risk" elderly patient has no worse chance for an uneventful recovery than the younger patient with a similar clinical picture. In other words, age should not contraindicate the use of anticoagulants, but their use should be indicated by the clinical picture. To illustrate one of the dangers, catheterization in the elderly patient taking anti-coagulants may be followed by a severe hemorrhage.

The question of the danger of prolonged bed rest in the elderly person with myocardial infarction has recently undergone critical evaluation. According to recent studies (13), it would seem that we are able in many instances to allow the elderly patient to get up in a chair far earlier than we had formerly believed possible. In spite of this observation, it is our impression that clinical judgment must prevail before allowing the elderly patient to get up from bed after having suffered a myocardial infarction.

It has been well stated (14) that in treating the aging patient, ". . . the important thing is to appreciate the total situation as it concerns the human being in question. There are times when what the textbooks or the authorities say just can't be done; it is just poor medicine, absolutely contraindicated. Treatment must be individualized, otherwise we make too many mistakes. We must

always weigh the pros and cons of each diagnostic and therapeutic procedure in terms of ultimate accomplishment and the patient's total welfare and happiness, otherwise we are guilty of poor medical practice." This principle of treatment and management peculiarly applies to our elderly patient with myocardial infarction.

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DIAGNOSIS AND TREATMENT OF GLIOMAS IN THE AGED

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Longevity is being attained by more and more persons because of modern medical advances. Pneumonia, often referred to as "the old man's friend," has succumbed to the direct attacks of the antibiotics and sulfonamides. More attention is being paid to older people, especially in medical circles, so that their illnesses are better understood and better care is available to them. Old age, however, is a term that cannot be measured by the chronometer, for it is well known that some are old at fifty while others are young at eighty. It becomes a matter of the tissues, how good they are to start with and how they are used or abused. The following remarks apply to people over sixty.

The treatment of any brain tumor is removal, which is a matter that concerns principally the neurological surgeon. At the age of sixty or over the gliomas represent roughly 50 per cent of brain tumors (1). They are of various types, but at this age most of them are found in the cerebral hemispheres, and over half of them are known as glioblastoma multiforme. This is a particularly malignant type of glioma in which, even with radical procedures, the prospect of complete removal is remote. Eighty per cent of tumors in adults occur above the tentorium and the reverse may be said to hold true in children. Unfortunately the more benign gliomas are found in the cerebellar hemispheres; the cystic astrocytoma of children is a good example (2). Thus it appears that, in older people, the neurological surgeon faces an almost hopeless prognosis in half of the verified gliomas he encounters. He may be able to accomplish something in the other half which are histologically benign, but here again his activities may be limited by the location of the tumor in an eloquent area of the brain.

The word "verified" is constantly used because histological examination is the final means of identifying tumors, especially with reference to their degree of malignancy. Thus it comes about that a preoperative estimate of the malignancy of a tumor may be modified for better or for worse by its appearance under the microscope. Even at operation the surgeon cannot be sure of the histological nature of a tumor but he can recognize its infiltrative characteristics, and from its position he can tell whether its removal will leave the patient with a serious neurological defect. These are the considerations which govern his actions when dealing with the tumor.

The glioblastoma multiforme has probably never been completely removed. In spite of extensive procedures including removal of a lobe or a hemisphere of the brain, the tumor recurs and death results. Following operation many patients die in the hospital; some say 40 per cent, others 10 per cent (3). This

Received for publication December 11, 1952.

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depends on the type of neurosurgical practice and whether or not patients are sent back to distant places. The hospital mortality of exploratory craniotomy and biopsy is high, but it is materially lessened by removing as much of the tumor as possible in order to provide a large internal decompression. The survival period, after radical removal and possibly two courses of x-ray therapy, is rarely more than 18 months. With the other types of gliomas, such as the more benign astrocytoma, the outlook is much brighter and some years of useful life may follow the removal of such a lesion.

The question comes up that if many of the gliomas of older people are highly malignant and incurable, why operate on them at all? There is, in addition, a considerable amount of social and economic difficulty connected with a long hospital stay which is finally terminated by death (4). For this reason attempts have been made to make a correct preoperative diagnosis of glioblastoma multiforme, but these have failed on many occasions. Later in this paper some mention of the differential diagnosis of brain tumor in later life will be made, and it will be shown that this in itself is difficult and sometimes impossible. Arteriography probably comes closer to providing a histological forecast than anything else, but the mistake between glioblastoma and meningioma occurs frequently enough to give one considerable pause. Everyone knows that the benign meningioma may often be removed with ease. In order to avoid what they consider to be unproductive operations, some neurological surgeons localize the tumor by arteriography, place a burr hole over it and then perform a needle biopsy. If it is a glioblastoma they leave it alone. Needle biopsy is not innocuous, for it carries a distinct mortality rate from swelling and occasional hemorrhage into a vascular tumor. Others prefer to localize the tumor by ventriculography, in which case they are committed to a decompressive operation. Experience has shown that immediate operation is mandatory after ventriculography, in an expanding lesion of the hemisphere. At such an operation, the surgeon may choose various procedures, from simple subtemporal decompression to extensive removal.

The writer prefers to localize the tumor by arteriography for several reasons. Older people suffer from a variety of cerebral ailments of which the majority are concerned with their cerebral vascular system. There is little danger from injecting 20 cc. of 35 per cent diodrast (10 cc. each for the lateral and anteroposterior views). This localizes the tumor, with some idea of its vascularity and type. Some days later, when proper arrangements have been made, the tumor can be exposed and dealt with. At this time a small piece is sent out for frozen section and histological diagnosis, and although this is not always accurate, between the surgeon and the pathologist a correct conclusion can usually be reached. What is done to any particular glioblastoma depends to some extent on the circumstances surrounding the patient who harbors it. In general, it is my plan to provide a large internal decompression by removing as much of the tumor as possible. The dura is closed and the bone flap replaced. This seems to me to have several advantages. The immedate mortality rate is about 10 per cent and the hospital mortality rate about 20 per cent. Those who leave the hospital often have several months of useful life, which may be necessary to get

affairs in order or to make a will. The closure of the dura and replacement of the bone flap prevents the unsightly bulge which might otherwise occur when the tumor recurs. Occasionally removal of a large part of the tumor would leave a permanent serious neurological defect and under these circumstances it is better to compromise. I have tried all methods, but the one just described gives a lower hospital mortality rate and in general more gratifying results than any other. The latter factors are also a matter of some concern to the referring physician.

The large internal decompression is followed after two weeks by a course of deep x-ray therapy to the tumor. When after a period of some weeks or months the tumor shows evidence of recurrence, another course of x-ray therapy is given. If this plan is carried out carefully and intensively the results may be temporarily remarkable. A word of warning may be in order to those who may be over-ambitious—there must be some type of decompression before x-ray therapy can be given, because of reactionary swelling in the brain. Several incidents come easily to mind in which an overenthusiastic x-ray therapist attempted to deliver therapy to what was presumed to be a glioblastoma in an intact skull. The result was a comatose patient requiring an emergency decompressive procedure. Emergency operations, often in the middle of the night, are usually unsatisfactory.

In other more benign types of tumor the same general principles are applied except that a conscientious attempt should be made at complete removal of the glioma.

DIAGNOSIS

This is fraught with many difficulties, although if the possibility of brain tumor is borne in mind the percentage of correct diagnoses will rise perceptibly. Persons of 60 years of age or over are especially prone to disturbances of the central nervous system, usually of a vascular nature—arteriosclerosis with epileptic manifestations, hypertension with cerebral hemorrhage and cerebral thrombosis, to mention only a few. Chronic subdural hematoma and metastatic tumors are also common. To this list must be added the cerebral tumor, of which the most elusive, at this age, is the glioma and especially the glioblastoma.

In advancing years the brain may not fill the cranial cavity as fully as it does in younger persons. There is a tendency to decreased vascularity, and secondary to this there may be a relative atrophy of cerebral tissue. This makes more space available to expanding lesions before the signs of increased intracranial pressure become apparent. In addition the glioblastoma of aged patients has a peculiar infiltrative quality whereby it invades rather than compresses. It is fairly common to find such a tumor in the absence of increased intracranial pressure; pineal shift may not be seen and even, rarely, a ventriculogram or encephalogram may appear to be within normal limits. These points add immeasurably to the difficulty of differentiating tumor from cerebral arteriosclerosis and cerebral softening. Epileptiform seizures, either focal or generalized, may occur secondary to vascular disease or to tumor, and the same can be said for per-

sonality changes and somnolence. Chronic subdural hematoma with its insidious onset may be present in a person whose memory for recent events is such that a minor head injury is forgotten or ignored. Metastatic tumor, either single or multiple, may be present in the brain and the focus of origin may be difficult to find. This is further complicated by the fact that metastatic tumors of the

FIG. 1. Case of Dr. E. P. The pineal gland (arrow) was shifted 1.5 cm. to the left by horizontal measurement between the inner tables (XX).

brain are frequently present when roentgen examination of the chest does not reveal any definite abnormality.

In the midst of this plethora of possibilities the answer is that every case of cerebral disturbance in the aged must be examined with completeness and care. The day is past when it can be dismissed as a cerebrovascular accident. Improved methods of diagnosis have uncovered a great many misconceptions with their consequent mistakes. In the first place a thorough history must be taken both from the patient and from the friends and relatives. This may require perse-

verence. A thorough physical and neurological examination must be made, which should include a spinal puncture with measurement of the spinal fluid pressure. The Queckenstedt maneuver of compressing the jugular vein *should not* be carried out. It goes without saying that the fundi must be examined and at least a rough estimate made of the contours of the visual fields. X-ray plates of the skull should be taken for calcified masses and pineal shift. The shift is usually seen in expanding lesions, whereas the gland is in its normal position in cerebral thrombosis or hemorrhage. Electroencephalography may disclose a slow-wave focus or it may show the suppression of alpha activity found over a chronic subdural hematoma. After these studies have been made it should

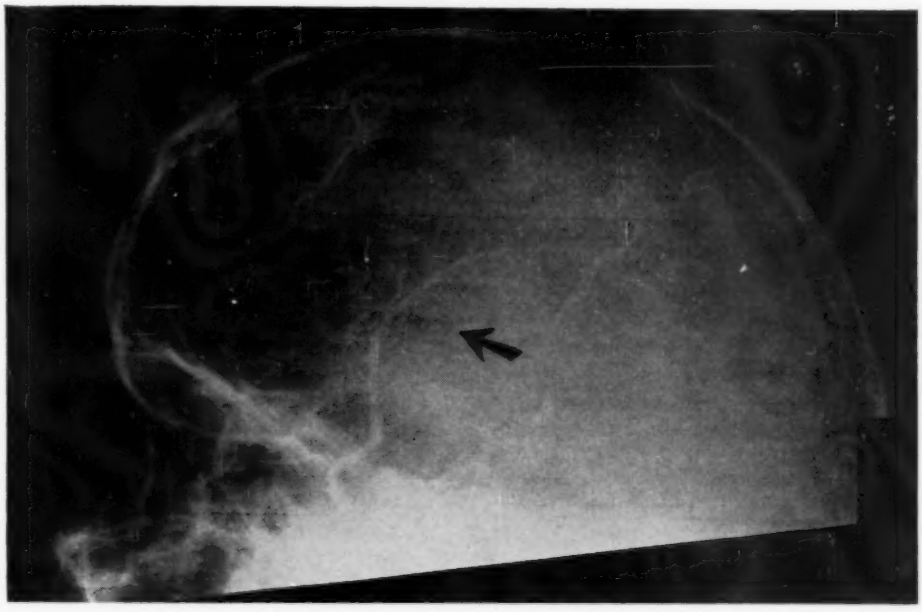

FIG. 2. Case of Dr. E. P. Marked upward bowing of the middle cerebral artery (arrow).

be rather apparent whether or not one is dealing with a typical cerebrovascular accident that conforms to all the well-known criteria. In the event that this is not the case, arteriography should be performed on the appropriate side. This will nearly always disclose the lesion, but if there is still some doubt the last recourse should be had to air studies, either encephalography or ventriculography, depending on the spinal fluid pressure. In a rare case even this battery of tests will fail and at autopsy the cerebral vascular accident will turn out to be a glioma of the hemisphere.

More thorough examination will bring out an amazing and hitherto unsuspected group of lesions previously mistaken for ordinary strokes: aneurysms, thromboses of the internal carotid artery, metastatic tumors with their occasional multiple lesions and, of course, gliomas and meningiomas. Surgical attack on some of these may be highly successful, but failure to investigate precludes the possibility of cure or amelioration.

To come back to the gliomas, it may well be said that the outlook for them is rather gloomy. This is true at least half the time, but who is to say which patient is to get a chance and which is not? This is scarcely in the province of the doctor,

FIG. 3. Case of Mrs. H. J. K. The pineal shift (arrow).

whose business it is to help the sick in the best way he can. Every surgeon can remember specific cases in which he regarded a patient as having a rather poor prognosis, and finally on persuasion he operated with unexpected success. Not every case is as difficult as expected and it must be pointed out that the mortality rate for untreated brain tumor of any kind is almost 100 per cent.

The search for the glioma leads to the discovery of other more amenable tumors and lesions with their subsequent satisfactory treatment. Take, for instance, the successful surgical treatment of certain intracranial aneurysms. Even cases of ordinary cerebral hemorrhage may show some prospect of benefit by surgical means. No one so far has made a good concerted effort to try to help these patients by evacuating the clot (5).

FIG. 4. Case of Mrs. H. J. K. Vascular pattern in the tumor (arrow). It was a meningioma.

The actual neurosurgical procedures involved do not differ materially from those employed in younger persons. It is important to try to perform the operation when the patient is in a stable condition. Urgent and emergency surgery in the aged adds materially to the risk. It is probably unnecessary to mention here that considerable preoperative and postoperative care must be given. Thus dehydration and nutritional difficulties are frequently met with, and these may be associated with disturbances of electrolyte balance and anemia. The cardiovascular and respiratory system require careful checking, as does the function of the kidneys.

These reasons make it important to try to arrive at an early diagnosis. Elderly patients in coma do very poorly at operation and even if they weather this, their postoperative course is stormy.

In summary, it may be said that the diagnosis of a glioma of the hemisphere in an elderly person is fraught with certain special difficulties. Atypical cerebral vascular accidents should come under suspicion and a careful and complete

FIG. 5. Case of Mrs. H. J. K. Left anterior cerebral artery bowed to the right (arrow), and the vascular pattern of the meningioma (arrow).

neurological work-up should be made. This should include spinal puncture, x-ray plates of the skull and chest, and electroencephalography. If these do not establish a diagnosis, arteriography and air studies may have to be performed. With proper consideration for the well-known functional weaknesses of the aging organism, the results of surgical treatment of the gliomas do not differ materially from those in a younger age group.

The following much abbreviated histories illustrate the main points of some of my remarks about the diagnosis.

Case of Dr. E. M. P.

This 61-year-old general practitioner was admitted to the hospital on April 23, 1952, because of mental confusion of gradual onset. In 1948 he suffered a concussion in an automobile accident. In 1950, most of his responsibilities had been shifted to his wife. He said that in December 1951 he suffered a blow to the forehead with loss of vision in the left eye. Following this he was very confused and

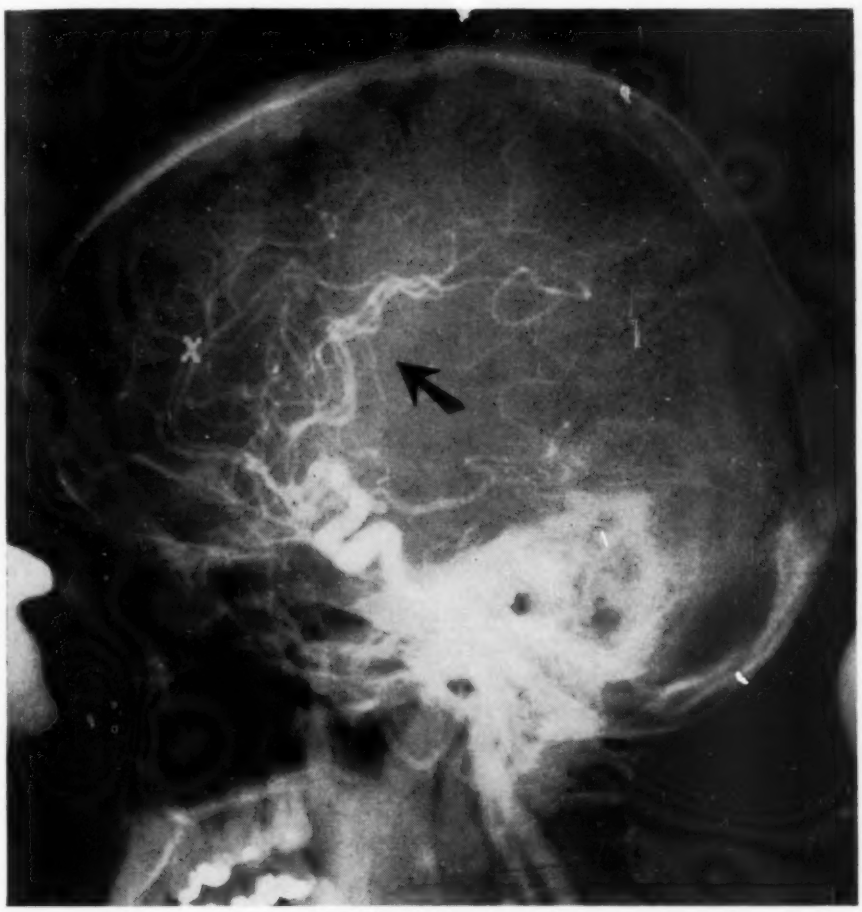

FIG. 6. Case of Mr. A. C. W. There is marked upward bowing of the middle cerebral artery (arrow). Both anterior cerebral arteries are filled (X).

would wander around at night. He was regarded as being an arteriosclerotic by those physicians who saw him. In April 1952, he consulted a doctor who took an x-ray picture of his head, which revealed a calcified area in the parietal region with a marked pineal shift to the left. Neurological examination showed few changes except for the ocular findings but there was a slight left facial weakness and his speech reflected his mental confusion. There was a left homonymous hemianopsia and nasal blurring of both optic discs. Spinal puncture was not

performed. The electrocencephalogram showed a slow-wave focus in the occipital region on the right. The arteriogram, though a poor picture, showed among other things the bowing of the middle cerebral artery over the tumor (FIGS. 1 and 2).

A 125-gm. meningioma was removed at operation and the patient was able to return to part of his practice in July 1952.

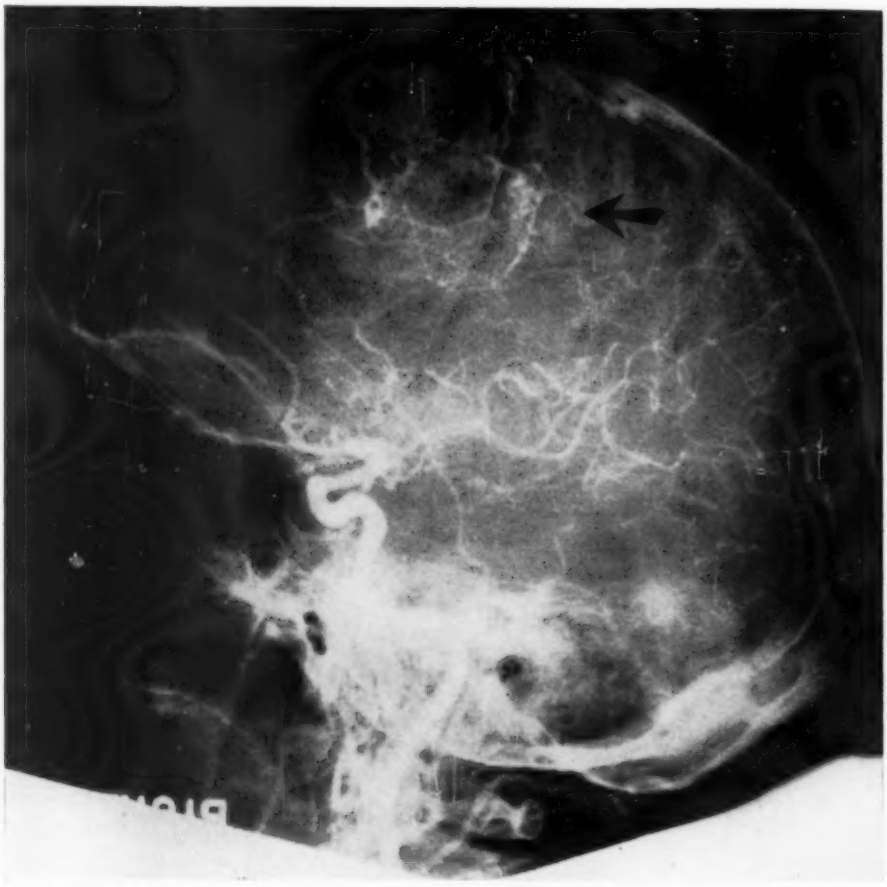

FIG. 7. Case of Mrs. N. C. The vascular pattern of a glioblastoma multiforme (arrow).

Case of Mrs. H. J. K.

This 65-year-old woman was admitted to the hospital on April 17, 1952, with a cloudy memory and convulsions. The history was hard to obtain, as she lived with an older sister who was unavailable. During 1950 and 1951 there was aberant behaviour and incomprehensible statements, which she dismissed in a humorous way when questioned about them. She became confused over such things as plugging in the toaster. In March 1952, the patient evidently had several convulsions in which she bit her tongue. She was regarded as having a cerebral degenerative condition secondary to arteriosclerosis.

On examination she would scarcely speak and appeared psychotic. There was

a right hyper-reflexia with weakness of the right side of the body and tremor of the right hand. I believed she was aphasic. Spinal fluid pressure was 160 mm. of water. X-ray examination of the skull revealed a pineal shift to the right. The electroencephalogram did not localize a lesion but the arteriogram outlined one clearly (FIGS. 3, 4 and 5).

A large baso-frontal meningioma was removed and as of November 1952, there appears to have been almost complete recovery.

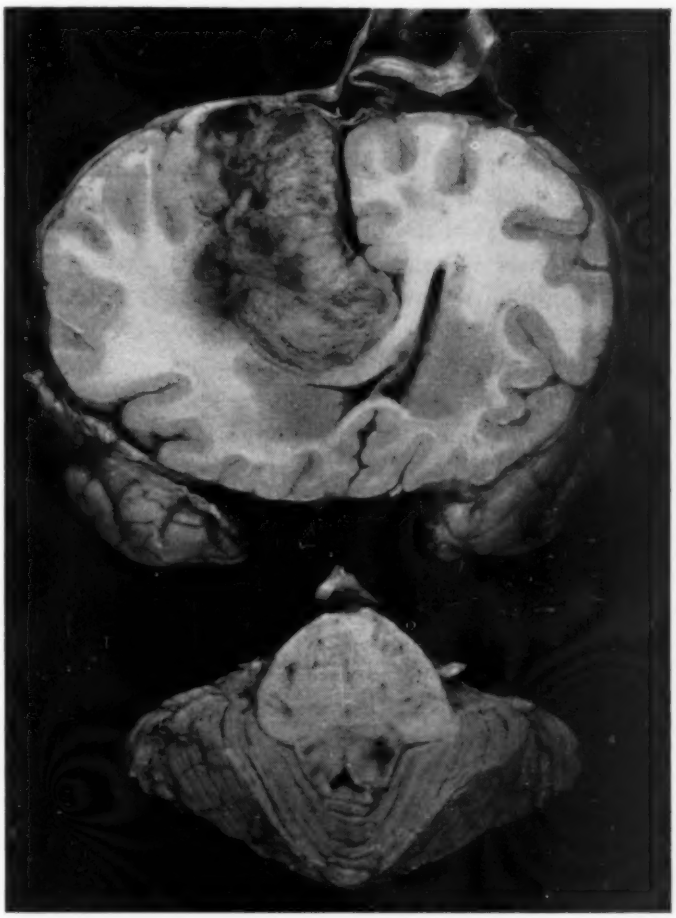

FIG. 8. Case of Mrs. N. C. Specimen obtained after 180 days in the hospital. Histologically this was a typical glioblastoma multiforme.

Case of Mr. A. C. W.

This 63-year-old man was admitted to the hospital in September 1952; he was confused and had weakness of the right side of the body. He was regarded as having had a vascular accident. In late August, two weeks before admission, he had visual disturbances on the right. He had had four automobile accidents involving the right side of his car. Four days before admission he became progressively more confused.

On examination there was a right hemiparesis with aphasia, some elevation of the deep reflexes on the right and an evanescent Babinski sign. There was a right homonymous hemianopsia and some signs of early choked discs. The patient was confused and drowsy. Spinal fluid pressure was 160 mm. of water and the protein was 160 mg. X-ray pictures of the skull and the electroencephalogram were not of localizing value. The arteriogram, however, clearly indicated a temporal lobe tumor. This was operated on two days later and a deep seated left temporal lobe glioblastoma multiforme was found (FIG. 6).

Case of Mrs. N. C.

This 62-year-old woman was admitted to the hospital on Oct. 24, 1950, complaining of inability to use the left arm and to walk straight. The inability to use the left arm had come on rather suddenly about three weeks before and a few days later she felt she had trouble controlling her left leg. On further questioning she said she had had a minor head injury about the time of onset of weakness of the arm. There were no headaches or other complaints.

General physical examination was rather complete but not remarkable and the past history was non-contributory. The blood pressure was 180/88. Neurological examination revealed deep reflexes, slightly more active on the right than on the left, and equivocal bilateral Babinski signs. The fields and fundi were normal. Spinal fluid examination showed a pressure of 130 mm. of water with a protein of 78 mg. X-ray examination showed the skull to be within normal limits. At this point she was regarded as having hypertension with cardiovascular disease.

A delta-wave focus was found in the right frontoparietal region by electroencephalography. Following this an arteriogram was made and was regarded as showing a right frontoparietal tumor, probably metastatic (FIG. 7).

Biopsy and partial removal of the tumor, however, brought out its true nature, which was glioblastoma multiforme. The patient died after 180 days in the hospital. An autopsy was performed and a photograph of the brain is seen in FIG. 8.

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THE MANAGEMENT OF INTRAOCULAR FOREIGN BODIES[1]

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Injuries of the eye by penetrating foreign bodies will never cease to command the interest of the ophthalmologist. Every case taxes his resources and is a challenge to his judgment and skill. Every acute injury demands his immediate study and decision, for in most cases the most favorable outcome depends on prompt measures. Good results in the management of these cases are contingent on the attention to minutiae, every one of which must be appreciated, and the failure to observe all may result in the loss of sight. There is little treatment in ophthalmology more exacting and none more gratifying and rewarding.

The mandatory precautions taken in industry may have reduced the incidence of these injuries, but these legal measures should not retard, but serve to stimulate the education of privately employed mechanics especially to understand the gravity of injuries to the eye. The use of protective measures by craftsmen, though frequently inconvenient, are indeed evidence of their intelligence and should be considered an important part of their various crafts.

The general principles for the management of these injuries are well understood. Every case presents its own questions and difficulties. The duration and extent of injury, the tissues involved and the complications coexisting in the eye must be considered. But the nature and size of the foreign particle, its exact position in the eyeball, whether it is free to shift its position, and whether more than one fragment is present, are all important. The successful management of such cases depends on precise answers to these questions and these depend upon the roentgenologist. Thus the treatment of these injuries is predicated on the findings of the roentgenologist, ophthalmoscopic and locator (Berman) observations notwithstanding. The roentgenologist must sense his importance in these cases and be prepared to give an accurate and full report. He must be skillful with methods which are entirely reliable. It is apropos, then, that the surgeon take an interest in the work of the roentgenologist, be prepared to carry out the procedure if necessary, and teach resident physicians methods which are altogether reliable.

The hand magnet for the extraction of magnetic bodies by the direct method has replaced the giant magnet, and depends for its success on accurate localization of the foreign body. The smaller magnet is much less likely to cause detachment of the retina and other complications, but precise localizing is imperative for its use. With the contact lens method, presently to be described, it is possible for the roentgenologist to localize a foreign fragment in the eye and give the

Received for publication December 9, 1952

[1] Read at the scientific session for ophthalmology of the 38th Clinical Congress of the American College of Surgeons, New York City, September 25, 1952.

points of its position with greater accuracy than the surgeon can utilize at operation.

Consummate care is required by the surgeon in applying the roentgen findings to the eye in order that the incision may be made directly over the foreign particle. If the incision is to one side of the particle, the pull of the magnet will most certainly detach the retina. Before proceeding with the dissection the surgeon should indicate the horizontal meridian of the cornea with short scratches near the limbus stained with fluorescin and from these make another short abrasion to indicate accurately the meridian in which the incision is to be made. The distance posterior to the limbus on this meridian is easily taken from the graft with the compass, and reduced to a third, since all measurements are given three times actual size. A Guist protractor is a serviceable instrument for use on the eye. In the absence of reliable roentgen localization use of the Berman locator may be resorted to; but this remarkable instrument cannot be substituted for but may be used as an adjunct to the more precise methods.

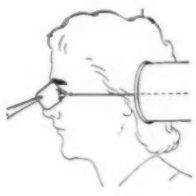

FIG. 1. A drawing showing the position of the dental film held over the inner canthus for the production of a bone-free roentgenogram of the anterior segment of the eye.

In every case of possible intraocular foreign body, bone-free roentgenograms should be made by Vogt's method (FIG. 1) (1). Roentgenograms made by this method show far more than those made with rays which penetrate the bones of the skull, and they reveal bodies of almost any density greater than that of the soft tissues. Small fragments of glass and minute metallic bodies whose shadows are lost in the grain of films exposed in the ordinary way can be shown. Bone-free roentgenograms are also valuable for determining the exact size and shape of bodies that have been localized on films exposed in the regular way. The more prominent the eye, the more useful is this method. An ordinary dental film is held over and perpendicular to the inner canthus of the eye, and the rays are directed from the side so that a shadow of the profile of the anterior segment of the eye, which includes the eyelids, the cornea, and portions of the sclera, is recorded on the film. This method is useful only for localizing fragments in the anterior 8 to 12 mm. of the eye. Although the procedure is used primarily for diagnosis, it may be employed to localize foreign bodies by directing the rays from various angles onto dental films marked with pencil lines aligned with the limbus or the apex of the cornea. The position of the body is noted with reference to the lines on the roentgenograms, the shadow of the limbus or of the apex of the cornea and the angle at which the rays were directed toward the films.

All mechanical devices available for use in roentgen examination to determine

the position of a foreign body in the eye use as a point of reference some definite part of the anterior segment, either the apex of the cornea or the plane of the limbus of the cornea. For this reason a fragment localized in or on the posterior sclera may be either in or out of the eyeball, depending on the size of the eyeball. A knowledge of the refraction of the eye is helpful. The position may be determined by injecting air into Tenon's capsule (2) and exposing films in such a manner that the rays pass in a line tangential to the sclera adjacent to the point at which the foreign body is known to lie.

Eyes in which more than one fragment is found pose a particularly difficult problem. Several pellets of equal size and shape may be impossible to differentiate and localize.

The method of localization of foreign bodies which is probably superior to all others is that which employs the contact lens (FIG. 2). The technic of this method is simple. It provides two roentgenograms, a postero-anterior and a lateral, which

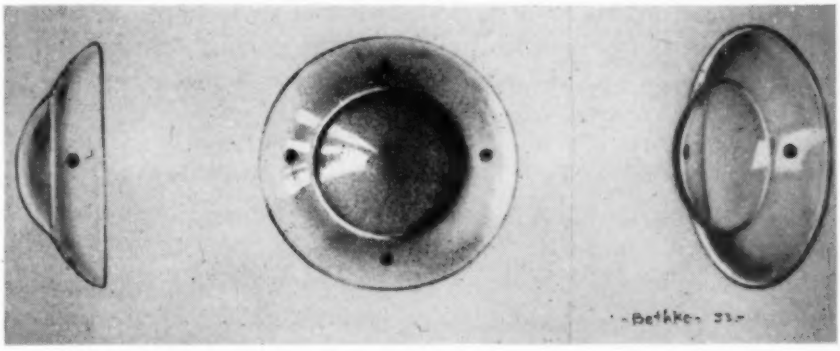

FIG. 2. The contact lens especially adapted for roentgenographic localization of intraocular foreign bodies by the addition of four radiopaque markers [from Pfeiffer (6)].

permit a meridional report, and is easiest for the surgeon to use when operating. The method of localization is rapid, requires a minimum of apparatus and is applicable in all cases. Its outstanding advantage, however, is accuracy. It achieves a degree of accuracy which cannot be approached by five other methods with which I have had experience. It is not possible to make a gross error with this method; in all instances in which the contact lens fits the eye, the body is localized precisely, not just within a few millimeters, which is the margin of error claimed for most of the other methods. It seems safe to predict that in the course of time this method will replace all others.

Comberg (3) in 1927 adapted the Zeiss contact lens for the localization of foreign bodies. Prior to that date Wessely (4) used a glass prosthesis with tinfoil markers and later a crystal prosthesis that fitted on the eyeball. These prostheses, however, gave only a clue to the position of the foreign body because they did not fit the eye well or follow its movements. Later they were sewed to the conjunctiva, and other disadvantages were thus introduced. Then Engelbrecht (5) designated the cornea with balls of celluloid with wire crosses, which answered most requirements successfully. The contact glass of Comberg, in which the

limbus of the cornea is designated by lead markers, fits tightly and moves with the eye. It is a lens of the type used for the correction of visual defects and, if the central visual acuity of the injured eye is not disturbed, it is possible for the eye to fixate with the prosthesis in place. A lens of average size is used, that is, one with a radius of 12 mm. for the scleral curve and of 8 mm. for the corneal curve. The lens may be inserted and removed with ease. When it has been sterilized, it may be used on a lacerated globe with impunity. Lenses of this type are manufactured in the United States of plastic material.

Two roentgen exposures are made, a lateral and an anteroposterior. Lines are drawn on the films to show the relationship of the foreign particle to the contact lens. The location is then indicated on charts that represent an anteroposterior view of the eye and a cross section cut in the meridian in which the foreign body lies.

In order to shorten the time required for the projections and to remove one source of error, I have adapted a special device, which is not, however, indispensable to the method (6). The device consists of an L-shaped arrangement of tunnels to hold the cassettes; with this device the patient's head may be maintained in one position and the position of the tube changed between the two exposures.

PROCEDURE OF OBTAINING THE ROENTGENOGRAMS

The eye containing the intraocular foreign body is anesthetized with several drops of 0.5 per cent solution of tetracaine hydrochloride. The patient is directed to look down, and the contact lens is inserted by slipping the glass under the upper lid and lifting the lower lid. The lens finds its proper position over the cornea.

Two exposures are made, a postero-anterior and a lateral. The L-shaped device is placed on the roentgenographic table and the positions of the tube for the two exposures are determined (Fig. 3).

In both positions the primary rays are directed perpendicular to the surface of a tunnel so that they pass through the eye containing the foreign body. The target-film distance is the same for each exposure; a distance of 35 to 40 inches (90 to 100 cm.) should be used.

The exposure for the postero-anterior view is made first. A patient with a foreign body in the right eye is instructed to lie on the table on his right side, with the right side of the head on the horizontal tunnel of the device. The tube is aligned in the horizontal position (Fig. 3). The head is placed so that the sagittal plane is horizontal and the injured eye is opposite the lower opening in the vertical tunnel. Through the opening in the vertical tunnel the position of the contact lens on the eye is checked, and the glass is rotated to place the markers in the vertical and horizontal planes. The patient is asked to gaze directly forward and to hold this position. To immobilize the head the patient may bite a bar attached to the L-shaped device. The position of the tube is checked; the cassette is placed in position in the vertical tunnel and the postero-anterior exposure is made.

With the patient in the same position the tube is aligned vertically and cen-

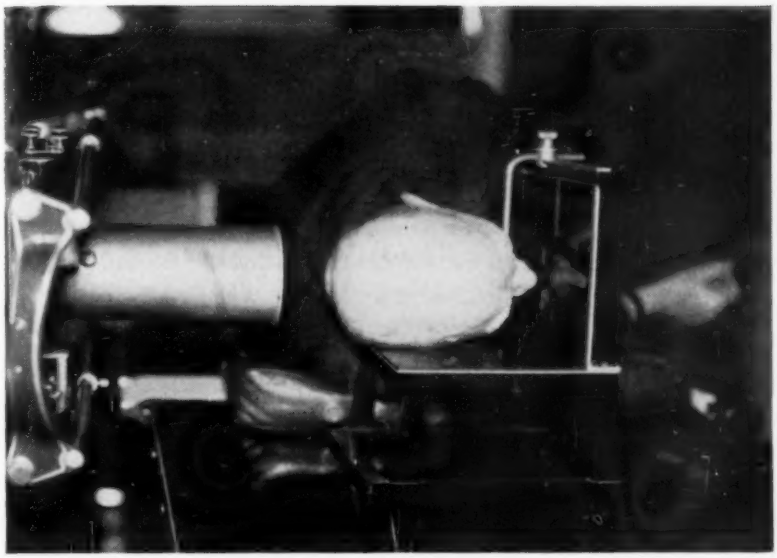

FIG. 3. The arrangement of the apparatus for the postero-anterior exposure. The patient is in position, with the contact lens on the right eye. Note the perfect lateral position of the patient's head, with the chin and nose against the vertical tunnel. Immobilization is gained by biting a bar attached to the L-shaped device. [From Pfeiffer (6)].

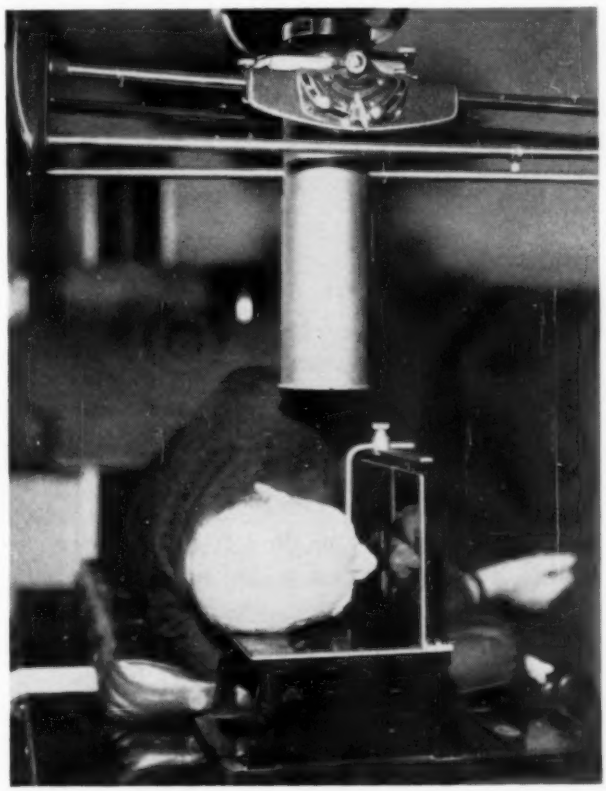

FIG. 4. The arrangement of the apparatus for the right lateral exposure; the film is placed in the horizontal tunnel. Note the alignment of the tube with the right orbit. The position of the contact lens can be checked through the apertures in the vertical tunnel. [From Pfeiffer (6)].

tered over the patient's eye for the lateral view (FIG. 4). The cassette is placed in the horizontal tunnel, under the patient's head; the position of the contact lens is checked and the second exposure is made. The patient is then permitted to sit in a chair while the films are developed. If they are satisfactory, the lens is removed. This is done easily by inserting a blunt hook or a tooth stick applicator under the lower edge of the lens while the patient looks up. A special rubber sucker may be used for inserting and removing the lens.

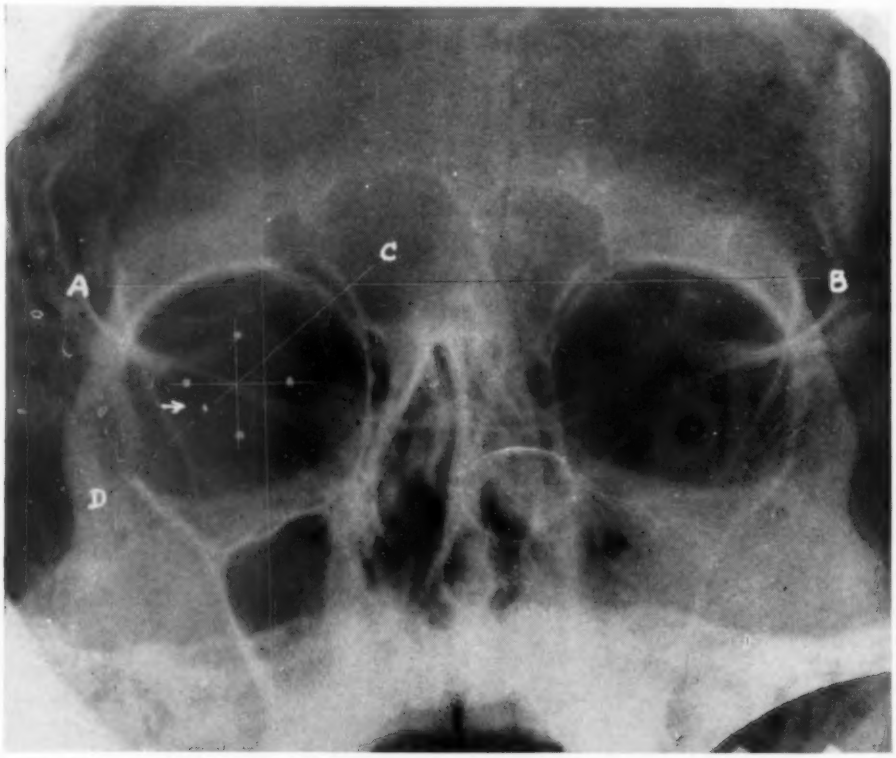

FIG. 5. Roentgenogram of an intraorbital foreign body, postero-anterior view, with lines drawn as described in the text. The long diagonal line CD, which passes through the center of the lens and the foreign body, indicates the meridian in which the body lies. The meridian is determined with the aid of line AB across the orbits.

For localization of a foreign body in the left eye the device is placed at the other end of the table, the patient lies on his left side and the procedure just described is followed.

Stereoscopic films of the head in the lateral or Caldwell position may be made to determine the presence of a foreign body before localization is undertaken. Cassettes with fine grain screens are used, and the exposures are made slightly less dense than for sinuses.

METHOD OF PLOTTING THE POSITION OF THE FOREIGN BODY

The film of the postero-anterior view is placed in the viewing box, and a horizontal line is drawn or scratched across the orbits several millimeters below the upper margins (FIG. 5, line AB). A horizontal and a vertical line are scratched

through the shadows of the markers on the contact lens to locate its center. A longer line (CD) is then drawn to bisect the foreign body and pass through the center of the lens. The angle formed by this line (CD) with the horizontal line through the upper part of the orbit (AB) is measured with a protractor and a corresponding line (C′D′) at this angle is plotted on a chart representing the front view of the eye (Fig. 7). Then with a compass and millimeter rule, the distance of the foreign particle from the center of the contact glass is measured.

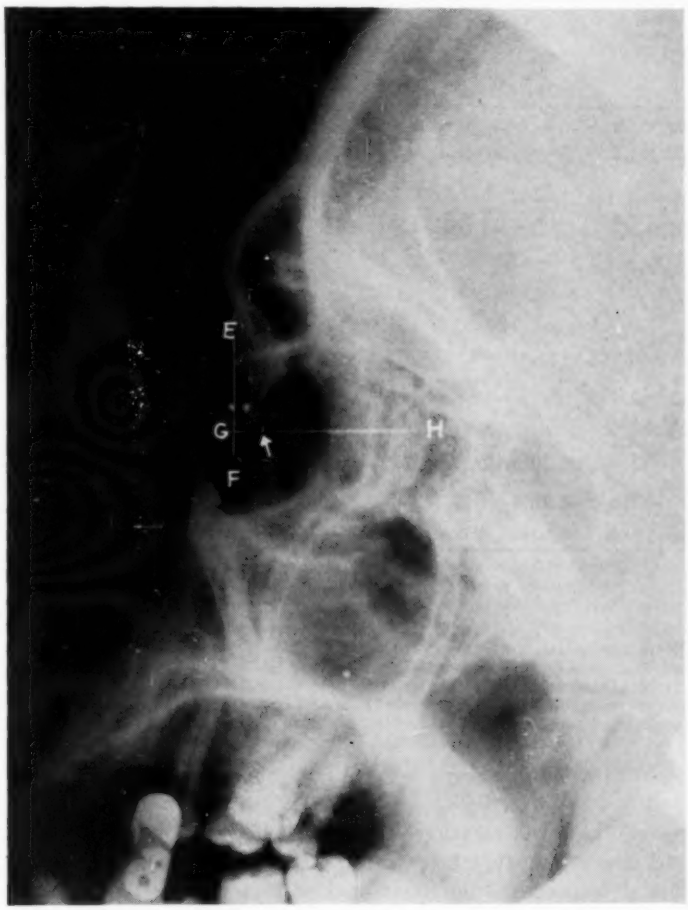

Fig. 6. Lateral view of an intraocular foreign body, with a line drawn anterior to the markers to indicate the plane of the limbus (EF). GH is drawn vertical to EF and through the foreign body, which is indicated by an arrow.

This measurement minus a correction for the magnification of the lens on the film, is transferred to the chart. The corrected measurement represents the distance of the foreign body from the anteroposterior axis of the eyeball. The size of the correction factor depends on several variables in the technic. The contact lens is 20 mm. in diameter, but on the film it may measure 22 mm. The error then is one tenth of the distance measured on the film. The actual distance of the foreign body from the axis of the eyeball (X) may be derived from the equation:

Actual diameter of contact glass: Diameter of contact glass on the film:: X: distance of foreign body from axis of eyeball on the film.

In placing the postero-anterior roentgenogram in the viewing box for measuring, care should be taken to see that it is viewed as an anteroposterior picture, that is, with the right orbit on the left side, as though the patient were being examined directly. The nasal or the temporal side of the eye should be carefully labeled

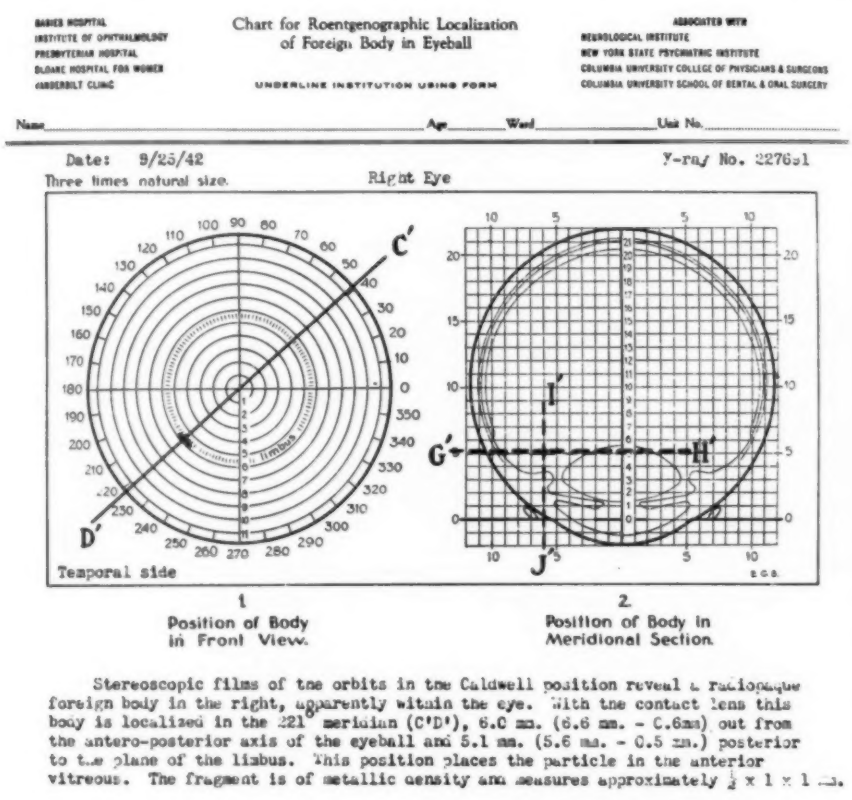
BABIES HOSPITAL
INSTITUTE OF OPHTHALMOLOGY
PRESBYTERIAN HOSPITAL
SLOANE HOSPITAL FOR WOMEN
VANDERBILT CLINIC
Chart for Roentgenographic Localization of Foreign Body in Eyeball
UNDERLINE INSTITUTION USING FORM
ASSOCIATED WITH
NEUROLOGICAL INSTITUTE
NEW YORK STATE PSYCHIATRIC INSTITUTE
COLUMBIA UNIVERSITY COLLEGE OF PHYSICIANS & SURGEONS
COLUMBIA UNIVERSITY SCHOOL OF DENTAL & ORAL SURGERY
Name
Age
Ward
Unit No.
Date: 9/25/42
X-ray No. 22761
Three times natural size.
Right Eye
C'
D'
G'
H'
I'
J'
Limbus
Temporal side
1
Position of Body in Front View.
2
Position of Body in Meridional Section.
Stereoscopic films of the orbits in the Caldwell position reveal a radiopaque foreign body in the right, apparently within the eye. With the contact lens this body is localized in the 221° meridian (C'D'), 6.0 mm. (6.6 mm. - 0.6mm) out from the antero-posterior axis of the eyeball and 5.1 mm. (5.6 mm. - 0.5 mm.) posterior to the plane of the limbus. This position places the particle in the anterior vitreous. The fragment is of metallic density and measures approximately ½ x 1 x 1 mm.
Doctor Pfeiffer
1

FIG. 7. Form on which the location of a foreign body is recorded, including the diagnostic report and charts showing the position of the foreign body as seen in a front view and in a meridional section. In the meridional section the position of the body is at the point at which lines I′J′ and G′H′ cross.

on the chart of the front view (FIG. 7). This information facilitates interpretation by the surgeon.

The film showing the lateral view (FIG. 6) is then placed in the viewing box and a line (EF) is drawn across the shadow of the contact lens, anterior and tangential to the markers of the lens, to locate the limbus of the cornea. A second line (GH) is drawn perpendicular to the first through the foreign body. A measurement is then taken along the second line from the foreign body to the plane of limbus. This measurement, corrected for magnification, represents the actual distance of the foreign body posterior to the plane of the limbus. The location

is then plotted on a chart representing a meridional section of the eyeball. A line (G′H′) is drawn across the chart parallel with the limbus at the depth calculated. A second line (I′J′) is drawn perpendicular to the first to represent the distance of the foreign body from the axis of the eyeball, which was determined previously. The point at which the two lines cross marks the position of the foreign body in a section of the eyeball at the meridian indicated in the chart of the front view. The charts are made three times the normal size of the eye to increase the accuracy in plotting.

SOURCES OF ERROR

The method of localizing intraocular foreign bodies by the use of a contact lens is probably the most accurate technic, for the markers in relation to which the foreign particle is localized rest directly on the eyeball and accurately indicate the position of the eye. Accuracy is gained, too, by using the plane of the limbus rather than the apex of the cornea as the point of reference in plotting the position of the foreign body. The two films reveal all the information needed for the plotting, and it is scarcely possible to make a significant error. From the roentgenograms one can tell whether the procedure was performed correctly. Chance superimposition of the foreign particle on a marker of the contact lens in the postero-anterior roentgenogram is not misleading, for the relationship is revealed in the lateral views. Objections to the use of screens scarcely apply to the present-day fine grain screens, which give excellent detail. Nothing is to be gained by using film holders.

There is, however, one source of error that may prove disconcerting. It is apparent that one contact lens will not fit all eyes, since eyeballs vary greatly in size and curvature. A lens of average size is used, and fair fitting is usually attained. Frequently there is a tendency for the lens to gravitate downward and thus to leave the curves of the cornea and the sclera. If this happens, the degree of slipping should be estimated and allowed for. The lens may be held in position, however, with the rubber end of a pencil or with a piece of thread the end of which is affixed to the lens with scotch tape.

If a vertical Bucky diaphragm is available, the method of exposing the films may be altered so that the patient sits in front of the diaphragm. The technic suggested by Comberg (3) may be followed, and the possible slipping of the lens obviated.

The pencil of primary rays should pass through the eyeball and be perpendicular to the film. Care should be exercised in orienting the tube for the exposures. The patient's head should be placed accurately on the L-shaped device, with the chin against the vertical tunnel and the forehead approximately 2 inches (5 cm.) away from it, to approximate the Caldwell position (note the position of the orbital structures on the postero-anterior roentgenogram (Fig. 5). The patient should be carefully instructed to gaze directly forward and not to move the eyes or the head during the exposures.

The measurements used in plotting the position of the foreign body should be determined with a compass from lines accurately scratched on the films,

and the meridian in which the body lies should be determined with a transparent protractor.

CONCLUSION

Roentgenographic localization of radiopaque intraocular foreign bodies with the aid of the contact glass of Comberg is accurate, simple, easy to perform, adaptable and requires a minimum of apparatus. A meridional graph of the location, derived from the roentgenograms, is achieved. Bone-free roentgenograms of every patient suspected of having an intraocular foreign body are recommended. The injection of air into Tenon's capsule is helpful in localizing deeply embedded foreign bodies.

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PROBLEMS RELATED TO ANESTHESIA IN GERIATRIC SURGERY[1, 2]

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It is common knowledge that there are more people of the older age group now alive than in previous generations. This probably is due in major portion to the diminished morbidity and mortality in the younger age groups. What is not known commonly, though, is that this older age group no longer has the morbidity or mortality that was once expected as a result of surgical procedures. Various factors influence this morbidity. Probably among the most important are the type of surgery, preoperative and postoperative care, and the physical state of the patient. It must be admitted that in emergency surgery, the mortality will be approximately 2½ times that which one will find in the elective surgical procedures. Patients of this group are more frail, they have various pathologic changes that are seen in the young, and in addition they have those alterations which occur with the process of aging. With increased knowledge and use of this knowledge, the mortality and morbidity can be and are being gradually reduced.

This group of patients should be approached as a team problem. This team should consist of the surgeon, the anesthetist, and the internist, each adding his particular knowledge to the common problem for the benefit of the patient. As always, the anesthetist's approach should be primarily for the welfare of the patient; secondarily, for the welfare of the surgeon, facilitating the ease of his work; and lastly, for the convenience of the anesthetist himself. He must approach this problem not as an isolated administration of an anesthetic, but from the standpoint of altering or correcting those pathologic states that are correctable, adding to the physician team that knowledge which will bring the patient to the operating room in the optimum state.

The chronologic age of these individuals is of very little significance. The physiologic age is of far greater importance. A careful evaluation of the history and physical examination and a careful correction of all the abnormalities that can be corrected at this time are essential. Complications must be anticipated and they can be anticipated only if one makes a careful evaluation of such things as the cardiovascular renal system, respiratory system, degree of sclerosis of the vessels, and renal function (especially the so-called spare). It must be realized that many of these individuals are malnourished, many of them suffering from stagnant hypoxia in spite of a normal blood count and hemoglobin and a normal

Received for publication October 18, 1952.

[1] Read at the annual meeting of the American Geriatrics Society, Chicago, Illinois, June 2, 1952.

[2] Published with the approval of the Chief Medical Director, Veterans Administration. Statements and conclusions published by the authors are the result of their own studies and do not necessarily reflect the opinion or policy of the Veterans Administration.

color in their usual routine. Many also have liver dysfunction or at least very little reserve in this organ and many are suffering from chronic shock or hypovolemia. The chests of many of these individuals are limited by their kyphosis and the rigidity of the costal cartilages. The lungs have lost some of their elasticity. One must check and make various cardio-respiratory studies such as minute volume, tidal volume, breath-holding time, etc. when indicated. The protein intake has often been so diminished in these individuals that they have a hypoproteinemia. All of this, therefore, predisposes to a more frail or a more easily damaged body. These individuals may show very little of the so-called deviation from the normal, but they cannot stand the strain which members of the younger are group can without showing signs and symptoms and sequelae.

PREOPERATIVE PREPARATION

Probably there is no group of patients in whom proper preoperative preparation will be of such tremendous importance as in the group of geriatric patients. There is in this group a narrow margin of error and therefore everything possible should be done to have the patient properly prepared. This preparation will depend, of course, upon the physical state of the individual, the operative procedure to be carried out, the diseases present in the individual, the anesthetic to be used, the degree of emergency, and similar factors. The importance of psychic preparation in these patients cannot be overlooked. Very frequently sedatives are used in place of this psychic preparation, to the detriment of the patient. It is true that they maintain an outward calm and therefore one could say that they need no sedative, but this is not necessarily true. An outward calmness may indeed mean an inner fright in many instances. Over-dosage with the narcotics is both easy and dangerous. The use of the barbiturates when patients are having pain is indeed dangerous. For the aged person, the barbiturates are a hazardous group of drugs, since they frequently depress the frontal cortex and inebriate the patient in a manner similar to that of an excess of alcoholic beverage. Therefore, in place of sedation, one gets a clinical excitation as a result of the release of normal inhibitions. The analgesic properties of the barbiturates are minimal, if present at all. The barbiturates are valuable for sedation and hypnosis but the dose should be individualized and no *pro re nata* orders permitted. The short acting drugs such as Seconal®, Amytal®, and Nembutal® are preferable to the intermediate or long acting barbiturates, in that an undesirable effect terminates itself more quickly when the drug is discontinued. In the presence of pain, the barbiturates may be used, provided the pain can be relieved by other drugs possessing analgesic properties. The dosage should always be markedly diminished. When morphine is used, we find that a dose of $\frac{1}{12}$ grain is our average dose in the very old; a dose of $\frac{1}{8}$ probably would be the maximum for a 60-year-old individual. Of course, this is subject to great variation, but rarely does an individual who is above the age of 55 get more than $\frac{1}{8}$. If more sedation is needed, other drugs are used as a supplement. Drugs of choice for a supplement are those such as paraldehyde, the bromides and chloral hydrate. Meperidine hydrochloride (Demerol) also is an excellent preanesthetic medication and it is a

fairly good analgesic, a fair hypnotic, but a relatively poor sedative. The depressant effect of meperidine when used in quantities of approximately 10 mg. is equivalent to that of approximately 1 mg. of morphine, or 100 mg. of meperidine is equivalent to $\frac{1}{6}$ grain of morphine. In the older age groups we find doses as small as 25 to 35 mg. of Demerol excellent. For ages 55 to 65, a 50 mg. dose of meperidine is frequently used by us.

It is important to emphasize that with modern anesthesia, the need for heavy pre-anesthetic medication to facilitate the induction and the maintenance of anesthesia is past. The anesthetist has many drugs and techniques at his disposal so that heavy premedication for purposes of facilitating anesthesia is not necessary and when it does become necessary in a rare instance, he has techniques at his disposal that can be used when and in the amount he desires.

It should be emphasized again that the dosage of atropine or scopolamine as compared to morphine should be in a ratio of 25:1. Atropine is preferable to scopolamine in most of the aged because of the occasional occurrence of the delirium-like state produced by scopolamine; yet when scopolamine does not produce the delirium-like state, it must be admitted that this drug is preferable to atropine because of its amnesic and sedative properties. If scopolamine is used and one sees a state of excitement, apomorphine in very small dosage—$\frac{1}{60}$ of a grain to $\frac{1}{30}$ of a grain maximum—is effective as an antidote to this scopolamine excitement phenomenon.

It is during the preoperative period that the importance of mobilization, coughing, deep breathing, turning, exercising, incomplete elimination of pain, and any other similar factors must be discussed and carefully explained to the patient. It is then that he can understand them. If he is given additional explanation subsequent to the operation, he can understand and carry out the regimen desired. Extreme care must be used not to frighten or confuse the patient.

It cannot be over-emphasized that the proper preoperative preparation is probably one of the greatest things that we as physicians can do to reduce the mortality in this age group. We must take a very careful history and perform a physical examination, including an x-ray plate of the chest and an electrocardiogram, if for no other reason than to have them available for purposes of comparison for picking up those differences which may be noted postoperatively. In elective surgery, we must energetically attempt to correct the hypoproteinemia that many of these people have, and to correct the anemia, the dehydration, the mineral and vitamin deficiency, the low blood volume, the edema that may be present, to combat congestive failure, and to eliminate foci of infection. We frequently see patients who have had a complete and careful work-up and excellent preparation, but whose teeth and gums are in perilous shape. This probably disposes to spread an infection from the upper to the lower respiratory tract. Another neglected portion of the work-up is a very careful evaluation of the state of the prostate. The preoperative preparation must be a coordinated affair between the anesthetist, the surgeon and the internist. It cannot be overemphasized that each adds his portion to the preparation, in order to bring the patient to the operating room in his optimum state.

MANAGEMENT OF ANESTHESIA

One frequently discusses the choice of anesthesia and in my opinion gives it much more importance than is usually justifiable. The anesthetic of choice, of course, in all instances depends upon the abilities of the individual anesthetist. It is unwise to say "use local" in a particular instance when a man may not have adequate training in the use of local anesthesia to make it work. Also, it is unwise to tell an anesthetist that cyclopropane is the anesthetic of choice in a particular operative procedure under particular conditions, when an anesthetist may have used it only a few times or it may not even be available in a particular institution. It is important that the anesthetist use that which has in the past given him the best results in cases of this type. Of course it is desirable that one should not have a fad or fashion dominate the choice of anesthesia and also it is important that one have as good an anesthetic as possible. However, there is no basis for saying that this or that anesthetic is most important unless one is dealing with a competent anesthetist; and in that instance, to tell a competent anesthetist what is indicated is indeed a waste of time.

There are, however, a few general principles which may be emphasized. It is important that, regardless of the type of anesthesia used, the patients be awake at the end of the procedure. There is less danger from vomiting, less danger of aspiration and of obstruction of the airway, less vascular and cardiovascular depression and much less chance of respiratory complications if the patient is awake, coughing, and breathing deeply soon after operation, rather than being depressed for a long period of time. Another general statement which may be mentioned is that blood should be replaced as it is lost. Over-transfusion or under-transfusion is dangerous. It is our custom to introduce one large needle, approximately No. 16 gauge, prior to the onset of anesthesia in almost all of our patients. In those instances in which major operative procedures are to be carried out, we usually start two intravenous infusions, one in either leg; we then attempt to use two No. 16 gauge needles.

Shock and hypotension are indeed dangerous in this type of individual and must be combatted by the appropriate methods. Intravenous fluids and blood are the most valuable armamentarium against shock; along with this, of course, the use of the various vasopressors cannot be overlooked. The vasopressor, however, must be looked upon as a crutch rather than as the answer to the shock problem. Recently prepared nor-epinephrine (Levophed®) in a dilute solution of 4 mg. to a liter of 5 per cent dextrose in water is an excellent vehicle for controlling blood pressure. With it one can control the blood pressure at almost any desired level. This can be gradually discontinued over a period of hours or even days as the patient's body mechanisms gradually return to normal. Various fluids such as $\frac{1}{6}$ molar lactate, may be used against the acidosis, if present, but extreme care must be exercised that the dose not leak out along the intravenous needle or extreme trophic changes may ensue. During the postoperative period, as long as the solution is being administered, someone should be taking the blood pressure every 10 to 15 minutes at least. The blood pressure must be taken every 2 to 5 minutes while the solution is first being administered. It must be

started by a physician, not a nurse, and the physician should not turn the patient over to the nurse until the blood pressure has been stabilized for at least 15 minutes. Blood, plasma, and fluids should be used as indicated in an attempt to discontinue the norepinephrine as soon as possible, for it is only a dangerous effective crutch.

Above all, such a solution as 5 per cent glucose in saline should be carefully avoided because the tendency in a long procedure is to let it run at a slow rate and when one finally checks the quantity that has been used, one frequently finds that amounts of 9 to 18 grams have been used. It is our custom to start a 250 to 500 cc. bottle of normal saline for the blood and a 1000 cc. bottle of 5 per cent glucose in water. Both of these are run very slowly, being used as a reserve and replacement of fluids lost. We prefer to undertransfuse slightly rather than overtransfuse. We also prefer to utilize the crystalloids rather than whole blood to maintain circulating blood volume, if the patient has been properly prepared, and to catch up in our blood replacement during the postoperative phase. We have a great fear of over-transfusion.

The anesthetic in the aged individual must be carefully watched. As mentioned previously, these patients are brittle. The anesthetic cannot be set and continue along the same path during an entire procedure. The patient's reactions should be judged from moment to moment and the anesthetic should be a kind of running bioassay of the individual's vital functions; it should be changed and maneuvered to give the patient and surgeon the maximum benefit with a minimum of harm. Relaxation with the use of the curares is now easily accomplished and the price one pays is relatively small when the skill and the knowledge of the pharmacology are adequate. It must be remembered, however, that certain subtle effects may persist for much longer than is frequently realized, and the dose of these curariform agents should be kept as small as possible while giving the surgeon as good working conditions as possible.

We feel that the use of local or regional supplementation to the general anesthetic is indeed important to the patient. We have repeatedly seen the patient's blood pressure rise, pulse decrease, and shock disappear when an adequate regional block is used in addition to the general anesthesia. This type of combined anesthesia was popularized by Drs. Lundy and Crile and is of tremendous importance to the surgical patient.

The anesthetic agent itself is of relatively little importance. The anesthetist is of major importance because it is he and not the agent who usually permits trauma, abnormal reflexes, shock, etc. to occur. The thing of importance to the anesthetist is that there be no hypoxia. These patients cannot stand hypoxia. The oxygen content of the blood must always be adequate. It is important that harmful reflexes be minimized as much as possible. It is for this reason that we so greatly appreciate the use of local anesthesia in addition to the general anesthesia in many of our operative procedures. Depression of respiration with the accumulation of carbon dioxide sets the stage for harmful reflexes which can cause various difficulties—anything from the maximum difficulty of a cardiac arrest to merely setting the stage for shock. The four horsemen of disaster in anesthesia

are hypoxia, hypercarbia, reflexes and shock. The anesthetist must be continuously aware of these danger points, preventing their occurrence rather than correcting them when they do occur.

Each anesthetic agent has its own characteristics and its good and bad points. Ether, for example, disturbs body metabolic functions somewhat, yet with modern anesthetic techniques, the endotracheal tube, and the curares, the anesthetic can be kept sufficiently light so that patients are awake within a very short period of time after the operative procedure and are disturbed very little. It is the basic type of anesthesia for the nation as a whole; yet there seems to be a trend away from this agent to many of the newer agents. Use of nitrous oxide anesthesia alone is fraught with danger because of the fact that one must either have adequate preanesthetic medication which is usually too depressing, or supplementation with drugs such as pentothal, etc. In many instances the oxygen content must be reduced to levels that, even though satisfactory for the young, are dangerous in the aged. Ethylene also, even though it permits a slightly higher content of oxygen, is in general an agent which is useful, but it also has its advantages and disadvantages. Its advantage, along with nitrous oxide, is that it is non-toxic to the body, but because of the diminished oxygen tension may be hazardous. It must be pointed out that this low oxygen tension may not be apparent unless one has done very careful analytical studies with the oximeter or similar apparatus. It is only then that one is surprised to find how low the oxygen tension can fall in spite of the fact that one thinks he is administering adequate oxygen.

Cyclopropane is a very valuable agent because of its relative lack of disturbance to the body metabolism owing to rapid induction, emergence, and high, oxygen content of respired gases. But, because of its cardiac effects, because of its tendency to depress respiration with the accumulation of carbon dioxide and because one must have more than usual skill in the use of this agent, it is not used or preferred by some. There is a popular misconception as to the pharmacology of cyclopropane. There are many who say that simply because a patient has some form of cardiac disease, he is not a good candidate for cyclopropane. We prefer to use cyclopropane in most patients with coronary disease, chiefly because this drug is relatively non-toxic to the myocardium, and also because the bradycardia which occurs with this drug tends to greater efficiency of the heart. The drug does increase the irritability of the heart and in those myocardial diseases which are characterized by bursts of extrasystoles or runs of premature beats or such things as paroxysmal tachycardias occurring frequently, the difficulties may be such that the drug should be used with caution, if at all. For those patients who have heart block or severe bradycardia, the drug is not a wise choice. The drug is contraindicated in severe heart block, severe bradycardia, and in a patient with a markedly hyperirritable myocardium, but, in instances like auricular fibrillation, mild heart strain of various types, or myocarditis, we use it as the drug of choice, and in our experience it has worked very well. In the hands of the skilled, it becomes an excellent agent, but it must be admitted that it is as dangerous as the skill or the lack of skill of the individual permits it to become.

Pentothal is a valuable inducing agent. Pentothal alone, of course, is very undesirable because of its sensitization to the vagal reflexes; as the dosage of pentothal increases, the drug becomes less and less of a quickly reversible agent and begins to have potentialities of a long-acting drug such as phenobarbital. It is very valuable as a basal anesthetic agent to nitrous oxide or ethylene, but it should not be used as a primary agent. We prefer to use pentothal only as a supplement to nitrous oxide or ethylene. It is not primarily an anesthetic in our opinion, but more a hypnotic, and one needs an analgesic-anesthetic type of drug if one is to gain the maximum efficiency from the anesthesia. It can be combined with various types of regional anesthesia, such as the spinal, caudal, saddle and epidural but, alone, it is a dangerous agent. It should, of course, never be used even for an induction in those patients having respiratory difficulty such as is found in carcinoma of the larynx, dyspnea and orthopnea. True, in the hands of the skilled there is no such thing as "never." One must make generalities on the mass of the population. Too frequently pentothal is a drug that pleases the patient but adds to the coronary spasm of the anesthetist who is primarily interested in the patient.

The need for curare is much less in this older age group than in most patients, since because of the flabbiness of the musculature and the relative hyporeflexia, these patients need less myoneural blocking action. Yet, when it is necessary, the curares may be a very valuable adjunct, but they should be used with caution. They should be used in as small a dose as possible and care should be taken in the repetition of doses, for it is desirable that these patients have as much muscular tone as possible. It would probably be preferable, however, in many instances where ether is being used, to employ a little deeper anesthesia and a small dose of curare, the combination of which probably gives a better physiologic effect than either very light ether and curare, or large doses of curare.

Low spinal anesthesias are excellent types, especially for operations on the pelvis and the lower extremities. The dosage, however, should be smaller in total amount, and the concentration should be lower. We are not particularly afraid of the blood pressure fall, because in this age group we use an intravenous infusion and watch the patient very carefully. Falls in blood pressure can be controlled almost as quickly as they occur. We prefer not to perform high abdominal operations under spinal anesthesia, but if a particular surgeon desires this type of anesthesia, we feel that we can carry out the procedure with a minimum of trauma and a minimum of pathologic disturbance, although we prefer not to use high spinal anesthesia in the aged.

Caudal anesthesia is truly an excellent form of anesthesia for all of the work in the back, the lower extremities, pelvis and pelvic floor, although we feel there are more reactions to caudal anesthesia than there are to many of the low spinals, the reactions being chiefly those to drugs such as procaine to which the aged are said to be more sensitive.

Refrigeration anesthesia, especially in diabetic or in arteriosclerotic individuals who have infections of the lower limbs, is desirable for therapy rather than for anesthesia per se. We prefer the use of refrigeration to decrease the toxicity and get the patient in ideal state; then for the anesthetic we frequently

use a combination of epidural anesthesia or some other regional form such as sciatic-femoral block, and some form of general anesthesia such as pentothal-nitrous oxide or cyclopropane-oxygen.

The aged are more tolerant to most forms of regional anesthesia, yet it must be admitted that most doctors who have recently completed their surgical training are getting inadequate training in regional and field block anesthesia. We personally feel that it is much better to carry out a fairly good general than a poor regional. It is said that the aged are sensitive to procaine or similar anesthetic drugs; at least it can safely be said that the drugs should be used in the smallest dosage possible, and there must be care in the use of the vasoconstrictors, also. Too frequently local anesthesia turns out to be vocal. Above all, past experience with a particular operator should indicate as to whether or not he can use various forms of regional anesthesia. We hear of cases in which individuals repeatedly attempt to use some form of regional anesthesia and then in the middle of the procedure have to ask for general anesthesia. We think it is far better to start out with the general anesthesia and to be prepared for any eventuality rather than to start with a local and then have to switch in the middle of the procedure to a general anesthetic, but we feel that balanced anesthesia, the combination of the regional and the general, is indeed of tremendous value to the patient.

It is important that at the close of the operative procedure, a thorough tracheobronchial cleansing be carried out, especially in those instances in which an endotracheal tube is in place. Even if at the end of the procedure there is no endotracheal tube, it may be advantageous frequently to pass a tube if only for this purpose. The inspired anesthetic gases which these patients are inhaling should be changed gradually from high oxygen to low oxygen, watching to see if there are any deleterious effects. Frequently, the mask is removed from the face of the patient at the end of the operative procedure with a very abrupt transition from an oxygen content of 70 per cent or over, to the room concentration. This may frequently precipitate an undesirable reaction on the part of the patient. It is much better to lower the oxygen tension gradually to that of the room air, with nitrous oxide-oxygen; and, if at some time along the course it is noticed that the patient's pulse begins to accelerate or he begins to perspire or show other signs of reaction, then the oxygen content can be kept at the optimum concentration by administering it to the patient while he is being removed from the operating table to his bed. No position should be utilized which has a hampering effect on respiration unless it is absolutely necessary to the accomplishment of the operation. Such positions as the acute lithotomy or marked Trendelenberg are harmful to the patient and should be avoided as much as is physically possible.

POSTOPERATIVE CARE

During the postoperative period these patients must be carefully and continuously watched. One must be very careful in moving them. They should be moved very slowly and only when one is sure that the movement will not do any damage. The patient with a blood pressure of 80/60 should not be moved until such time as one is sure that he is in maximum physical condition. He should

be moved in such a way as to allow for continuous administration of the intravenous fluids. It would be preferable also that one watch the blood pressure from the time the operation is completed until the time the patient is put in bed and turned over to competent help. Too frequently the sphygmomanometer is removed, the intravenous fluids are stopped, and it is during this time when all the movement is taking place that the patient goes into shock. The intravenous fluid apparatus should be left in place, care being taken that it continue functioning during the transportation.

It is important that the stir-up regimen be put into effect immediately; that is, the patients should be made to take 6 deep breaths each 15 minutes and cough each 15 to 30 minutes. Carbon dioxide-air for stimulation of respiration should be used, if necessary. These patients should turn themselves from side to side every half hour. They should not be permitted to lie flat on their backs, until they are in complete control of their faculties. This is probably one of the most important parts of postoperative care. The side that the patient is lying on should be recorded on the chart just as if the patient were given a drug. Excess saline and fluids should be carefully avoided. The airway must be kept clear. Sedatives should be kept at absolute minimum and when possible, regional forms of anesthesia must be used to prevent pain. Oxygen used on a surgical patient had best be administered by nasal catheter or a mask rather than by tent, unless the patient really doesn't need a high concentration of oxygen. During hot weather, of course, a tent may prove very valuable. We have frequently resorted to the use of a mask or the catheter in a tent during hot weather, thus obtaining both the cooling effect and the high oxygen concentration. Ambulation is frequently confused with actually walking around the room. We prefer to use the term mobilization. We prefer to see that the patient exercises his arms and legs, ankles, and toes. It is important that this be carried on preoperatively and the patient educated in the forms of deep breathing and the movements that will be expected of him postoperatively, because it is very difficult to teach an aged, disoriented patient who is just emerging from an anesthetic these various procedures.

Distention is to be carefully avoided by judicious use of an intestinal tube. Distention frequently leads to visceral herniation and thoracic complications as well. Tight dressings or binders should be avoided. Anything which interferes with tidal exchange increases the possibility of atelectasis and pneumonitis.

SUMMARY

We have mentioned most of the important factors in the preoperative preparation of the patient, the anesthetic care, and the postoperative care; yet, we feel that only by the careful attention to all details can one continue to reduce the morbidity and mortality in this age group. The aged must not be denied surgery because with care and attention to details, they can survive even the most difficult and prolonged type of surgery It was only a few years ago that one of the leading surgeons of America stated that the esophagus was beyond the realm of surgery, and yet today literally hundreds of aged patients are surviving even this type of operation, one of the most major of surgical procedures.

SURGERY OF THE COLON IN THE GERIATRIC PATIENT

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Major surgical procedures of the colon in the elderly patient cause little systemic insult. The extremely low operative mortality is an indication that present methods of surgical management are better than those of ten years ago. One of the greatest causes of patient morbidity in the past ten-year period has been the multiple-stage operations for cancer of the colon. Such patients were confined to their beds with heavy clamps on the abdomen and a fecal stream running over a freshly closed wound. A spur clamp was placed, usually about the fifth day, at which time the three-bladed clamp was removed and this further immobilized the patient until about the twelfth postoperative day. Usually these colostomies were not closed for about ten weeks, adding further to the accumulated morbidity. Resection, with immediate anastomosis and restoration of physiologic continuity of the bowel, has replaced such procedures almost completely.

One of the most important contributions in colon surgery is the use of antibiotic drugs, both in the preparation of the colon for surgery and in the postoperative phase. In the past, most deaths following surgery of the colon were related to sepsis or its sequela. This leaves coronary thrombosis, cerebral thrombosis, and pulmonary embolus as causes of death for which little can be done at present.

Until the age of 80, there can be little hesitation when resections of the colon are indicated, particularly for cancer or obstructing diverticulitis. After this age, careful consideration must be given each patient. One often hears the dictum, "the physiologic age is more important than the chronologic age," which is partly true; but after 80 years, regardless of all other factors, the operative mortality rises sharply. The effects of time cannot be undone entirely by new drugs or by the application of physiologic principles.

PREPARATION FOR SURGERY

Before elective surgery, the elderly patient's condition must be carefully evaluated. We believe the internist is better qualified for this, since he views the patient as a unit rather than a part. There is careful consideration of the cardiovascular renal system. Cardiac performance is determined by the patient's history and electrocardiograms are made more for base line evaluation than for diagnosis. Any postoperative changes may be compared with these earlier tracings and thus become more significant and diagnostic. Early ambulation may be limited by the discovery of such changes in the tracing. We do not digitalize the elderly patient unless there is evidence of cardiac failure or a limited or poor cardiac reserve. Actually, heart failure or coronary thrombosis are rare as a cause of death in the postoperative period.

Received for publication December 3, 1952.

ARTERIOSCLEROSIS

Those patients who exhibit progressive cerebrovascular deterioration are very poor surgical risks. These changes are not always obvious and often it is necessary to talk to various members of the family to find out whether or not such deterioration has occurred. An observation period of three or four days in the hospital prior to surgery will often disclose hyper-irritability and forgetfulness. Confusion and complete disorientation may supervene even prior to surgery. Such patients tolerate drugs very poorly and small doses of morphine or demerol may either confuse them more or contribute to their disorientation. When one adds a major surgical procedure and a period of immobilization as well, it is easy to appreciate the grave risk involved.

CONSERVATIVE TREATMENT METHOD

Practically all the patients over the age of 60 years with colon lesions come to operation because of cancer. A small number are subjected to decompression procedures or resection for obstructing or perforating diverticulitis. When cancer of the colon or rectum is found in the aged patient (over 80 years), special consideration should be given for palliative or conservative methods of treatment and management. Since cancer of the colon or rectum is fatal if left unattended, and since about half of all patients operated on survive five years, there cannot be much consideration for conservatism in the younger age group. Cancers of the colon and rectum, however, are slow-growing and are often well localized lesions admirably adapted to surgical excision. Only about half the cancers of the rectum show lymph node metastasis. We may well use these facts to argue the case for surgical intervention and we may use them equally well to argue the case for conservative treatment in the aged and infirm. One often is confronted with the elderly patient bearing a biopsy report of adenocarcinoma and a large sessile papilloma of the rectum, a portion of which has undergone malignant change. Numerous reports on the clinical benignancy of such lesions can be found (1–5) and any decision for radical surgery should be based on careful evaluation of the tumors and of the patient. We feel that there is not much overall risk of metastasis or recurrence following the local ablation of such tumors (6) and one certainly is justified in conservative methods of treatment. Frank cancers of the rectum may be treated by fulguration and radon seed implantation with surprisingly effective palliation in the aged or debilitated patient. The location of such tumors will determine the method of treatment employed. Should the carcinoma be at sphincter level, local methods are not applicable because of sphincter interference and pain. Simple posterior resection of the rectum may be preferred in these cases. Tumors on the posterior and lateral walls of the rectum above the sphincter may be destroyed by coagulation or radon-seed implantation or both. Those on the anterior wall may be destroyed by coagulation in stages, with particular care in reference to the adjacent prostate or bladder neck (male) and vagina (female). When lesions are located in the upper rectum or low sigmoid colon within reach of the sigmoidoscope, effective and safe palliation is obtained by repeated superficial fulguration, usually at three-week intervals until obstruction is relieved or in some cases until the tumor

has disappeared entirely. That these tumors often grow slowly is demonstrated by one of our patients now 89 years of age who has been treated in this manner for eleven years for a cancer of the rectosigmoid. Originally he was seen here in 1942 at the age of 78 years, at which time he was recovering from a disabling and severe coronary occlusion and since that time he has had one other massive occlusion.

Cancers of the colon in the aged and poor-risk patient present a slightly different problem. One is not able to treat them locally because of their situation. Most of them are manifest because of obstruction or anemia, and surgery is indicated for these reasons. The decision to open the abdomen, unfortunately, is not the last one to make in such patients. Certain broad principles should be kept in mind if cure cannot be effected by resection. In most cases the lesion should be removed and obstruction overcome, even in the presence of liver metastasis. So-called palliative resections with anastomosis are not truly palliative if there is peritoneal seeding of the tumor or if cancer is present at the line of anastomosis. All too often the patient is back in the hospital in four to six months with obstruction caused by recurrent tumor at the line of anastomosis and with no appreciable change in size or growth of the liver metastasis. Insecure anastomoses, such as those made low in the pelvis, should not be performed in the presence of massive liver metastasis. Healing is faulty, nutrition is poor, and peritonitis from separation at the suture line often follows. Should a lesion be irremovable locally because of fixation to some vital structure, some by-pass procedure is indicated for relief of obstruction. Colostomy is to be avoided at all costs unless it will prolong life by overcoming well-established obstruction. It is our belief that too many so-called "palliative colostomies" have been made in the past. There are altogether too many lay people who know of the patient with the "tube in his side" who died a few months after he left the hospital. In most cases, minimal obstruction from the neoplasm may be overcome by a low-residue diet and small daily doses of a saline cathartic. Insoluble sulfonamide drugs such as sulfathallidine or sulfacetamide (thalamyd) are most effective in reducing local infection and cellulitis around the neoplasm, with resultant relief of partial obstruction. Since all cancers of the rectum and colon bleed rather constantly, iron replacement is indicated, and in many instances the hemoglobin values can actually be raised.

Diverticulitis may demand surgical intervention in the aged because of complications such as perforation and obstruction, or occasionally because of sigmoidovesical fistula. Radical resection is not advised in the poor-risk elderly patient, since proximal colostomy will solve most of the problems. Since life expectancy following colostomy in diverticulitis is equally good regardless of age, radical extirpation of the disease seems wholly unnecessary and unjustified. Simple closure of the colostomy is performed at some later date when there is clinical and roentgen evidence of healing, with patency of the lumen.

ANESTHESIA

Since January 1950 we have carried out 505 resections of the colon under continuous spinal anesthesia. This type of anesthetic has several distinct ad-

vantages over others. There are minimal changes in blood pressure and there are no systemic side effects such as acidosis or dehydration, or toxic effects on the liver. There are no periods of anoxia. The anesthetic effect is regional rather than total. A ureteral type of catheter is placed in the subdural space and taped in position. The anesthetic agent is given in small amounts to determine the patient's tolerance as far as blood pressure is concerned. Usually a fraction of the usual anesthetic dose is sufficient for adequate relaxation and the operative procedure is often completed with only small additional doses.

POSTOPERATIVE MANAGEMENT

As a rule, all patients are ambulatory eight to ten hours after surgery and three times daily beginning the first postoperative day. Sitting in deep chairs causes compression of the return venous flow from the legs and such chairs are removed from the room. Levin tubes are removed as soon as possible, since they occasionally excite bronchopneumonia in old people. Bladder catheters also are left in only for short periods because of the incidence of cystitis. Penicillin is given in large doses for 36 hours and we believe this has resulted in almost complete disappearance of pulmonary complications or at least amelioration of those that occur. Active motions of the legs and feet are instituted and all efforts are made to promote a brisk return venous flow.

PHLEBITIS AND PULMONARY EMBOLUS

Deep phlebitis occasionally is seen in the patient with inoperable cancer of the bowel when exploratory laparotomy has been performed. Fortunately, it is rare as compared to previous years. Leg veins are cautiously avoided for the use of intravenous solution and the legs are wrapped tightly with elastic bandages while the patient is on the table. These precautions, together with the use of antibiotic drugs and ambulation, and voluntary exercises of the extremities have probably contributed to this low incidence of phlebitis. Pulmonary embolus has not been seen as the cause of death in surgery of the colon since 1949. An analysis of deaths due to embolus prior to this time revealed that it occurred in those patients with additional complications, usually sepsis. Since sepsis is rare with the use of the newer antibiotic drugs, pulmonary embolus as the cause of hospital mortality is on the decline. We cannot feel secure in this knowledge, however, since a certain small percentage of elderly patients die at home of pulmonary embolus in the immediate postoperative period.

RESULTS

Between January 1950 and June 1952 we have carried out 345 resections of the colon and rectum. Twenty of these have been for diverticulitis and the remaining for cancer. There have been four deaths in this group with a combined hospital mortality of 1.1 per cent. Three of these deaths were in cancer patients, making a hospital mortality of less than 1 per cent for this group.

Table 1 lists each mortality and its cause. It is noteworthy that no death occurred directly or indirectly from sepsis—our reason for considering modern antibiotic drugs a great contribution to surgery.

Table 2 lists the operative procedures used. Of 345 resections, only 12 were of the exteriorization type with temporary colostomy.

Table 3 shows the change-over from exteriorization procedures and their attendant morbidity to single-stage operations with immediate anastomosis—one of the main reasons for lowered morbidity in colon surgery.

TABLE 1

Analysis of Deaths

325 Resections for Cancer and Diverticulitis

(January 1950 to June 1952)

Age 67. Resection sigmoid colon with anastomosis for obstruction due to diverticulitis. Died of coronary occlusion on 9th day. Autopsy obtained.

Age 88. Right colectomy for carcinoma cecum. Died 7th postoperative day. Autopsy obtained. Cause of death not determined.

Age 70. Abdomino-perineal resection of rectum for carcinoma. Autopsy obtained. Cause of death not determined.

Age 71. Abdomino-perineal resection of rectum for carcinoma. No autopsy obtained. Cause of death: probable coronary occlusion.

TABLE 2

Resections for Cancer and Diverticulitis

(January 1950 to June 1952)

Operative Procedure	
Abdomino-perineal resection	122
Resection with anastomosis	
For cancer	176
For diverticulitis	20
Obstructive resection	12
Hartman resection	10
Sphincter preservation procedures	5
Total	345*

* 4 postoperative deaths.
(1.1 per cent mortality)

TABLE 3

*Colon Resection**

Year	Obstructive resection	Immediate anastomosis
1947–1948	96	23
1950–1951	8	142

* Where surgeon could choose between the two types of resection.

SUMMARY

There is little risk in operative procedures for cancer of the colon in elderly patients. Three hundred twenty-five resections with three deaths are reported. In so far as can be determined, no death was preventable. The operative

mortality in this group is under 2 per cent. The modern colon surgeon employs resection with immediate anastomosis when possible. This results in low patient morbidity and complications are few as compared with multiple-stage exteriorization procedures. The antibiotic drugs can be given much of the credit for lowered mortality and morbidity, since sepsis and its sequela have practically disappeared as a cause of death. The incidence of phlebitis and pulmonary embolus is decreasing, probably because of antibiotic drugs. Patients in the eighth decade are grave operative risks and serious consideration should be given to palliative measures. Complications of colon cancer, such as obstruction, hemorrhage, or severe anemia make surgery mandatory regardless of age.

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ESOPHAGEAL HIATUS HERNIA

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The most common type of diaphragmatic hernia in adult life is a hernia through the esophageal hiatus. Hernias through the aortic or vena caval openings in the diaphragm rarely occur. The content of the hiatus esophageal hernia is usually the cardiac end of the stomach, but can consist of a large part of the stomach or omentum and occasionally the colon.

Diaphragmatic hernias, other than the hiatus type, may be due to congenital structural deficiencies or they may be caused by traumatic rupture or inflammatory necrosis of the normal diaphragm. There are many types of diaphragmatic congenital hernias due to the unusual embryonic formation of the diaphragm. They may occur through the pleural peritoneal hiatus, through a gap left by the partial absence of the diaphragm, a gap which is usually situated in the posterior portion of the muscle, or through the anterior subcostosternal opening (foramen of Morgagni or Larrey's spaces). The pleural peritoneal hiatus is due to lack of fusion between the septum transversum and the pleuroperitoneal membrane. There may also be a congenital hiatus hernia due to deficiency of the circular muscle bundles of the hiatus or due to an esophagus so short that some of the stomach is above the diaphragm.

Traumatic hernias are most commonly due to stab or gunshot wounds but may result also from a crushing injury as, for instance, from an automobile accident. A subdiaphragmatic abscess may occasionally cause an inflammatory necrosis of the diaphragm, leading to hernia formation.

Hiatus hernia may be classified into three types. The congenital short esophagus is probably not a true hernia but rather a developmental defect. Here the stomach develops primarily in the thorax. The esophagus has never really passed through the diaphragm, and the stomach, or a portion of it, has always been above the diaphragm. There is usually a hernial sac.

In the esophagogastric hiatus hernia the stomach is herniated into the chest and the esophagus is also elevated. There is usually a hernial sac. The location is most often to the left, as the right is protected by the dome of the right lobe of the liver. The hernia usually extends into the posterior mediastinum. The esophagus often appears to be shortened but actually there is a contraction of the lower esophagus, probably the result of vagal irritation.

In the third type, the para-esophageal hiatus hernia, the lower end of the esophagus remains in its normal relation to the diaphragmatic opening and the cardia of the stomach herniates laterally through the opening into the thorax. It is a sliding type of hernia and may become fixed to the structures in the thorax.

The two latter types are the clinically important hernias. They usually are

Received for publication October 23, 1952.

not distinguishable clinically. The great majority occur in the age group over fifty years. There probably is a congenital weakness but other factors, such as an increase in intra-abdominal pressure, are very important in their development. They are most common in women. Overweight, especially an increase in abdominal fat, is an important and common finding. Ascites or large abdominal tumors occasionally are causative agents. Trauma or injury at times may be implicated.

Many hernias cause no symptoms and are discovered accidentally in routine gastro-intestinal x-ray examinations. Patients may have symptoms only at intervals. The clinical picture is most variable and Harrington stressed the fact that this is often the second or third diagnosis.

About 10 per cent of cases of hiatus hernia cause pain. Regurgitation or vomiting, fullness and belching of gas are the most consistent symptoms. Anemia with or without hematemesis and melena characterizes other cases. Less commonly they may show dysphagia, pyrosis or acid regurgitation and hiccups.

The pain is usually beneath the lower half of the sternum, often radiating to the back or left scapula. Occasionally it is referred to the left shoulder. The pain may vary from a feeling of distress or pressure beneath the sternum to a severe, acute pain. At times it is burning in character. A true anginal pain due to reflex spasm of the coronaries occasionally occurs. It often comes on during the course of, or soon after, a heavy meal. In some cases it is initiated or aggravated when the patient assumes a recumbent position and is relieved when the semi-erect position is taken. It also may be initiated at times by bending, stooping or straining. Emotional tension at meal time may bring on the pain. Occasionally, in the sliding type, it can be relieved by assuming the upright position plus stretching.

Dysphagia is common, especially if there is complicating ulceration. Vomiting occurs soon after meals, and food or liquids are often brought up unchanged.

There may be reflex cardiac symptoms such as tachycardia, heart consciousness or anginal pain. Paroxysmal auricular fibrillation has occasionally been observed. In large hernias pulmonary symptoms such as dyspnea and cough may be present.

Anemia is at times a most important symptom. This is due to ulceration of the mucous membranes, but the ulceration may be so superficial that it is difficult to demonstrate by x-ray examination. Hematemesis and melena may make the bleeding evident. A number of cases are seen, especially in older women, in which severe hypochromic, microcytic anemia develops, without any localizing symptoms. Often patients present themselves with weakness, shortness of breath or ankle edema. The blood count may be as low as two or three million with a low color index. The patient is not aware of the blood loss. Examination of the stool shows the presence of blood. It is an important cause to keep in mind in the differential diagnosis of hypochromic anemia. Many patients have no gastrointestinal symptoms.

The diagnosis depends on a careful roentgen examination. If the diagnosis is suspected by the clinician, it is a good policy to inform the roentgenologist of

the clinical diagnosis, so a more thorough study will be undertaken. It may be necessary to use the Trendelenburg position to cause a satisfactory filling of the subdiaphragmatic portion of the stomach. Some operators use various methods to increase the intra-abdominal pressure. If a small quantity of barium is first swallowed, the rugae at times may be demonstrated above the diaphragm. Sometimes better results are obtained by rotating the patient obliquely with the right side forward thirty degrees while drinking a thick barium mixture. The findings are not constant and repeated examination may be necessary. Further examination in the standing position will determine whether the hernia will reduce and slide below the diaphragm. Occasionally an air bubble in the stomach above the diaphragm may be seen on routine chest examination.

Esophagoscopy may help to make an accurate diagnosis. The hernia may occasionally be pushed down as the scope is passed so it is difficult to demonstrate. A scope should always be passed prior to surgery.

The symptoms are not constant or characteristic, so the differential diagnosis may be very difficult and finally is largely dependent on x-ray examination. Gallbladder disease may give almost the same symptom complex. It is not uncommon for both conditions to be present at the same time.

Several months ago we had a patient in whom severe attacks of pain developed beneath the lower sternum extending into the back. These attacks came on in the evening an hour or two after supper. The patient was a nervous, tense man of fifty years of age. There was a definite feeling of substernal pressure. The electrocardiogram was normal. The pain was not relieved by alkalies, atropine or nitroglycerine. It recurred several times each month, especially if he ate a large meal. The attacks were so severe that he had to be given a hypodermic of demerol on several occasions. X-ray examination on two occasions showed a hiatus hernia. X-ray of the gallbladder with dye repeatedly resulted in non-visualization. He was given a specific diet and anti-spasmodics but the attacks recurred. Eventually his left phrenic nerve was crushed. Symptoms disappeared for three months and then recurred. Finally his gallbladder was explored and found to contain stones, so a cholecystectomy was performed. He has now been symptom free for the last two months.

Peptic ulcer, carcinoma of the stomach and gastric hyperacidity may resemble hiatus hernia. A good many patients with symptoms of angina pectoris are relieved when hiatus hernia is treated. It also must be remembered that electrocardiograms taken during an attack of pain of a hiatus hernia may be abnormal and may show the pattern of coronary insufficiency. Hiatus hernia must be considered in the differential diagnosis of unexplained secondary anemia, especially in the cases without gastro-intestinal symptoms.

Various esophageal conditions such as diverticulum, esophageal peptic ulcer, cardiospasm and carcinoma of the esophagus can usually be differentiated by careful x-ray examination or by the esophagoscope.

Three members of one family have had hiatus hernia and each presented a different symptom complex. The occurrence of these cases in one family makes one conjecture that there is a hereditary congenital local weakness.

A woman sixty years old complained of burning, sharp, upper epigastric

pain coming on soon after breakfast. On questioning it was found that the character of the food did not seem to influence the pain. She stated that she had recently gained some abdominal girth. The patient had acquired the habit of eating breakfast in bed in a semi-reclining position. X-ray examination showed a small hiatus hernia. The patient was instructed to eat small meals slowly and to sit erect while eating. The symptoms rapidly disappeared. She was also given a weight-reducing diet. Ten years later a new group of symptoms developed. She complained of tiredness, shortness of breath on stair climbing, and ankle edema. She appeared very pale and a blood count showed a hemoglobin of 8.6 grams or 54.6 per cent and a red blood count of 3,270,000; in other words, a hypochromic anemia. The differential count was normal and no abnormal white blood cells were found. Results of stool tests were strongly positive for blood, although the patient was not aware of gastro-intestinal bleeding. An x-ray examination now demonstrated a large para-esophageal hiatus hernia. A careful diet with soft food and small meals plus an antispasmodic were prescribed. Iron was given by mouth. The anemia was rapidly corrected. The patient has been followed for a year and her stool shows no blood. She has lost some weight following her diet.

The second case in this family was a man fifty-six years of age who complained of severe epigastric pain coming on soon after going to bed. The pain was of a burning nature. It was not relieved by alkalies. He vomited at times, especially if he took fluids soon before retiring. The vomitus was not acid. He often read in bed propped up on pillows. X-ray examination showed a hiatus hernia. He was given an ulcer diet, with a small supper. An antispasmodic was given before meals, and alkalies after meals. He reduced weight to decrease his abdominal fat and, in turn, his abdominal pressure. After a ten-pound weight loss all symptoms disappeared. Two years later mild symptoms again appeared. It was found he had gained ten pounds in weight. Again he was put on a diet and after a moderate weight loss his symptoms disappeared.

The third patient had symptoms of pain and burning an hour or more after meals. X-ray plates showed a hiatus hernia and a duodenal diverticulum. He was relieved by small, simple meals, with milk between meals, plus antispasmodics and alkalies. It is impossible to tell whether his symptoms are due to the hernia or to the duodenal condition. His symptoms frequently recur because of carelessness in his eating habits.

Hiatus hernia may present no symptoms and require no treatment. A careful history and an analysis of the factors that precipitate symptoms may indicate the proper management. The nature of the condition and the manner in which it causes symptoms should be carefully explained to the patient. He should take small meals, avoiding coarse food. Meals should be eaten slowly and thoroughly masticated. He must sit straight and upright while eating and must remain upright an hour or two after meals. He should not eat just before retiring. Antispasmodic sedatives and alkalies may help to relieve symptoms. Losing weight to reduce the intra-abdominal tension is all that is necessary in some patients.

These measures will control most cases of hiatus hernia, and all authors agree

that surgical repair is seldom necessary, except occasionally in very large hernias or in hernias that are not reducible. Harrington reports the successful repair of a large number of cases. He prefers the abdominal approach. The technical difficulties of adequate exposure of the hernial opening through the left portion of the diaphragm and the hiatus hernia, are often considerable because of the fixation of the left lobe of the liver to the leaf of the diaphragm.

Frequently the left phrenic nerve is preliminarily crushed by a forceps so as temporarily to paralyze the function of the diaphragm. Recovery takes place in three to six months.

After the hernia is exposed the contents must be replaced in the abdomen, the hernial sac removed and the diaphragmatic opening closed by overlapping the margins of the opening. Usually this results in a successful repair.

CONCLUSION

Hiatus hernia is a common finding on routine gastro-intestinal examination but in many cases it does not cause any symptoms.

The clinical picture of hiatus hernia varies greatly and may resemble that of many other upper abdominal conditions.

One symptom that should be stressed is severe hypochromic anemia, often without gastro-intestinal symptoms.

Except for the rare congenital type, it is particularly a condition found in patients over fifty years of age.

The majority of cases will respond to medical management. When necessary, surgical treatment, if properly performed, is usually successful.

GERIATRIC NOTES[1]

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Compulsory retirement at the age of 65 is stripping the nation of vast and invaluable resources of skill, experience and productivity.

Talent, imagination and efficiency do not automatically evaporate because a person reaches a certain age. The widespread tendency to put everyone past 65 "on the shelf" amounts to a waste of brain and man-power of a large segment of our population.

The problem of preserving the creative factor in persons past 65 has been described as "socio-medical." Industry, labor, and government agencies should co-operate with geriatricians to foster the contribution that older citizens can still make to our national life.

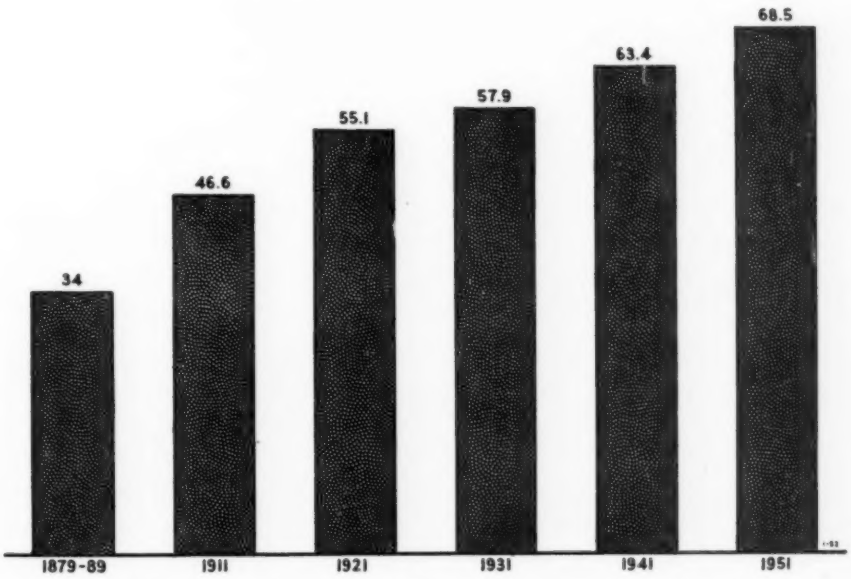

FIG. 1. Expectation of life at birth, in years 1879 to 1951. Industrial policyholders of the Metropolitan Life Insurance Company. (Weekly and monthly premium-paying business combined for 1951; weekly alone in prior years. *Note*—Excludes death from enemy action.)

The aged should be kept at work. Old people disintegrate mentally and physically when they are unoccupied and become a burden on their relatives and on the state.

Anyone who wonders whether it is worthwhile to reach old age should visit the William I. Sirovich Day Center in New York City. There, the aged really

Received for publication July 16, 1952.

[1] Read at the Annual Meeting of the American Geriatrics Society, Chicago, Illinois, June 6, 1952.

find much to make life worth living; they participate in musical programs, work at ceramics, sculpture and millinery, dance, and are provided with channels for constructive activities.

The rapid increase in the elderly population has created many problems. FIG. 1 shows how the expectation of life has increased. Naturally there has been an increase in deaths from degenerative diseases. The most common causes of death among policyholders of the Metropolitan Life Insurance in 1951 are shown in FIG. 2.

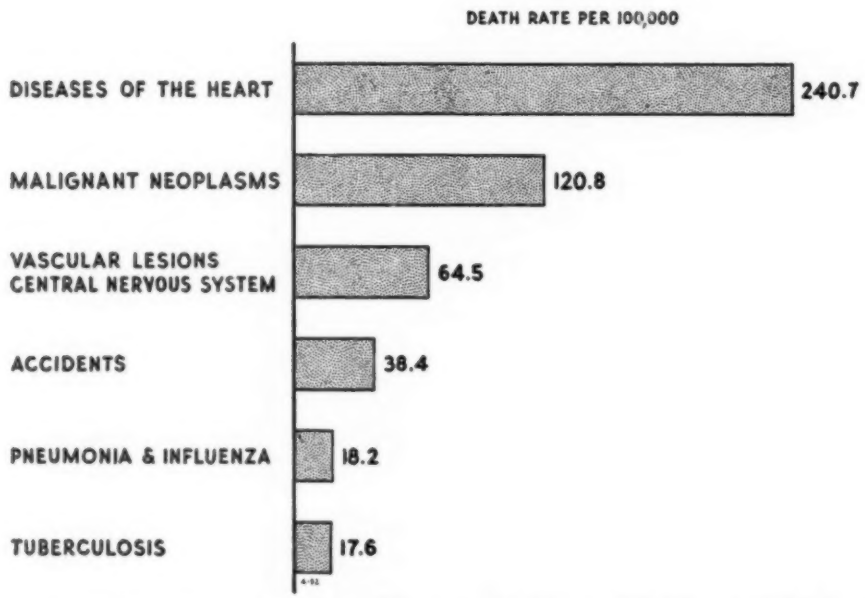

FIG. 2. Leading causes of deaths, 1951. Industrial policyholders of the Metropolitan Life Insurance Company. (Weekly and monthly premium-paying business combined.)

As the population increases, there will be a greater need of institutional care of the elderly. Hospitals are already overcrowded; it has become expensive for the old to be cared for.

Possibly the solution is better care of ambulatory patients. Many aged patients today are ambulatory. They can be cared for in physicians' offices and in clinics and should not congest hospitals.

What to do with the elderly population is a capital problem, which geriatricians, gerontologists, and the government—if they all co-operate—may well solve.

BOOK REVIEWS

Diseases in Old Age. R. T. Monroe. Harvard University, Monograph in Med. & Pub. Health 11.407 pp. 8° Cambridge 1951.

Diseases of 7941 patients over 61 years of age have been observed in Peter Bent Brigham Hospital between 1913–1943; 23.3 per cent of the patients died; in 1177 autopsy was performed. In the majority of cases systolic blood pressure higher than 140 mm. Hg was found. The most frequent reason for hospitalization was heart ailments. The next in high percentage was chronic polyarthritis. In 507 patients chronic gastric ulcers had developed and in 1010, gallstones. One hundred fifty-five patients showed cirrhosis of the liver, whereas acute glomerulonephritis was found in 23 cases only. However, 221 patients had been suffering from pyelonephritis. In 791 patients there were various symptoms of diabetes. In 1110 patients malignant developments of diseases of various nature were observed. The most frequent were gastric carcinomata, diagnosed in 259 cases; they were followed in number by 128 cases of carcinomas of the colon. There were 117 cases of cancer of the prostate gland and 74 cases of mammal carcinoma. Bronchial carcinoma was found in 69 cases only. Not over 43.6 per cent of the male and 46.7 per cent of the female patients showed normal body weight.

It is to be hoped that these statistics can be continued in this reliable manner. Such a study may lead to more exact research of morbidity in aged people. The book is well written and is highly recommended.

Tuberculosis in the Aged. E. Tengve. 114 pp. 8°. Oriel Blombergs Nya Aktiebolaget, Lindesberg, Sweden. 1951.

Symptomatology, prognosis, course and progress of tuberculosis is discussed. Reports are made on a series of examinations of 887 hospitalized patients and 86 patients, aged 60 and over, in homes for old people. Frequency of occurrence of tuberculosis in the elderly is proved. Exudative, miliary, productive and cirrhotic-indurative morphological types are described.

Sixty-six per cent of the patients in homes for aged persons showed extensive chronic pulmonary changes. Aside from stationary foci of tuberculosis, severe exacerbations were observed in many cases. Subfebrile temperature in the aged is a frequent occurrence In over 50 per cent of the patients under observation other intrapulmonary diseases were found as well, especially arteriosclerosis. Malignant tumors, or disturbances of metabolism were seldom present. In old women secondary phenomena are quite frequent, more so than in men. Such secondary diseases may activate latent tuberculosis.

In 10 per cent of the aged people examined, extrapulmonary caseous tuberculosis was diagnosed. In the series of old people under observation for tuberculosis the mortality reached its highest quota between the ages of 50 to 68.

This book is valuable, especially since tuberculosis is a serious problem in the aged.

Current Geriatric Literature

PREPARATION NEEDED FOR HAPPY AND USEFUL LATER YEARS.
H. I. Clarke.
Mental Health, Wisconsin Assoc. Ment. Health **15:** 19, 1952.

Approximately 15 per cent of the present population of the U.S.A. belongs to the age group popularly and perhaps cruelly dubbed "aged." Is old age the automatic reaching of some arbitrarily designated year such as sixty-five? Legally perhaps, but actually, by no means. For many, it is true, old age automatically signifies economic dependence, physical disability, psychological deterioration, perhaps even senility. However, a scientific concept of old age, and certainly a kinder one, does not characterize this period by such negative factors. The evidence is that a great many have attained a ripe old age with cheerfulness, dignity, adjustment and usefulness. Growing old should mean acceptance of the inevitability of changes. It should mean to society and individuals themselves lessening of physical and psychological vigor, not necessarily illness and senility. It should mean slower work habits but not absence of work. It may signify a smaller range of contacts but not necessarily narrower interests. It should mean community regard and not community indifference or neglect. It also should mean self respect and not self pity. Growing old is a function of living. Old age has a place in society; society needs old people. It is logical that society should expect from members of older age groups contributions of which they are capable. Society should welcome such contributions. It should see that opportunities are provided for those who can contribute their experience and skill. If the aged person is to be useful and happy, he must have learned his adjusting mechanism much earlier. Internal security means acceptance of the inevitability of changing conditions.

Society must in turn accept the responsibility of meeting the needs of the aging. It must encourage public understanding of the problems of aging. It also should provide preventive medical resources to prolong life. Doctors, nurses, clinics, hospitals, home and institutional medical care for the aged are required. Housing facilities should be adapted to the needs of the age group. Social insurances should afford a decent minimum standard of living. Thus, the elderly and those who are going to be old have the responsibility of preparation for old age.

THE MENTAL HYGIENE OF AGING.
P. V. Lemkau.
Pub. Health Rep. No. 67, March 1952, p. 237.

Mental hygiene, extending satisfaction of living and decreasing incidence of mental disease, is as feasible for older as for younger groups. Two basic concepts underlie this belief: 1) There is apparently no direct relationship between anatomical changes in the brain and the behavior of the personality. 2) The capacity to function is lost when not exercised. It, therefore, is well for human beings to maintain a wide range of interests throughout life; also to entertain and react to a broad range of stimuli. In order to achieve this, the aging individual must maintain his physical health at its maximum. Change of interests, socio-economic problems and group activity of the aged are discussed.

The goal of the problems of mental hygiene of aging is the opportunity to work for pay, if the elderly man is capable and willing to do so. The aging people, who do not achieve this goal, could profit from using leisure time through group activities and hobbies, which bring happiness and relief to the elderly and are means of preventing the appearance of symptoms of mental disease.

There are many compelling reasons for carrying out mental hygiene programs with the

aged. One of these is prevention of the financial and social load of psychoses of old age. Very important items are the giving of health and aid to the aged to lead an abundant life with social contacts.

PSYCHIATRIC APPROACH IN THE REHABILITATION AND CARE OF PATIENTS IN THE SOUTHERN WISCONSIN COLONY AND TRAINING SCHOOL.
Editorial.
Mental Health, Wisconsin Assoc. Ment. Health. **15:** 13, 1952.

The Southern Wisconsin Colony and Training School has recently established a specific clinic setting for programming and care of its patients. Multiple functioning of the institution has made it imperative to develop a psychiatric approach. With the population comprising bedridden patients, aged persons and others, the clinical and educational settings have been combined.

A study was undertaken for the purpose of reviewing the psychiatric implications in the cases of 57 patients over 40. An outstanding problem at this institution has been social rehabilitation or long-term planning for older patients. Formerly, the outlook for institutionalized defectives over 40 became progressively less optimistic. Therefore, the clinic has considered the staffing of such cases imperative. In doing so the following points were to determine particularly: 1) the likelihood of long-term institutionalization of subjects at the colony; 2) potentials for any form of temporary discharge; 3) need for eventual transfer to another institution.

Orientation of the staff to psychiatric approach in managing patients necessarily involves continuous guidance over a long period. However, the present outlook for the program is very optimistic. An in-service training program for psychiatric aides was instituted. The clinical staff analyzes and determines individual needs and sets up appropriate programs. However, carrying out the various measures is dependent upon the personnel in daily contact with the patients.

It is intended that not only the institutional workers, but also the general public will become cognizant of this fact: "Psychiatry does not fix any iron curtain against the problems of mental deficiency."

PSYCHOTHERAPY IN SENESCENCE.
G. J. Wayne.
Ann. West. Med. & Surg. **6:** 88, 1952.

The urgent need for additional psychotherapeutic work with the elderly is emphasized. The cultural dilemma of the aged is discussed, as well as certain psychiatrists' resistance to treating the aged. A method of psychotherapy is presented and discussed. According to this, a therapist should possess spontaneous warmth of manner to get along successfully with elderly people. In this way an atmosphere of contrived friendliness is avoided. The aged are as sensitive to insincereity as children are.

Frequency and duration of therapy varies widely. The quieter tempo of the patient's life can be expressed tacitly in the flexibility of scheduling.

The constant increase of aged persons in the population emphasizes the need of both individual and group therapy. Psychiatric treatment of overt psychoses in the aged is not sufficient, nor is additional domiciliary care the answer. Elderly persons should by all means receive the benefits of psychotherapy.

A FULLER LIFE FOR LATER YEARS.
J. W. Dugger.
Mississippi Doctor **29:** 202, 1952.

Geriatrics, a former stepchild of medicine, is finally beginning to be accorded the attention it deserves. Growing interest in geriatrics has been stimulated by the knowledge that we are becoming a nation of middle-aged and elderly persons. Attendant to rapid growth

of median-aged population there is a corresponding increase in disability, degenerative diseases, and physical and mental impairment. These facts point up the wisdom of giving geriatrics alert and earnest consideration. There are many diseases the frequency of which increases sharply after the peak of maturity is reached. Chronic and progressive disorders of senescence create circulatory and renal diseases associated with arteriosclerosis and hypertension. Degenerative diseases often show a tendency to overlap one another. They all impair health by interfering with the nutrition of parenchymal cells through alteration of the intercellular matrix. The doctor aware of the changes due to aging should appreciate the concept of constructive medicine. Prevention of disease in geriatric patients is not enough.

The object of geriatrics is to add breadth and depth, rather than mere length to life. Prophylaxis, especially during the fifth and sixth decades of life, is most essential. Thereby geriatric medicine will assist mankind to realize fully its vast and splendid potentialities.

A COMPARISON OF AGE IN SALIVARY GLANDS OF MAN AND OF THE RAT.
W. Andrew.
J. Gerontol. **7:** 178, 1952.

Following surgery a study has been made of 31 human salivary glands—parotid as well as submandibular. The subjects were from 54 to 83 years old.

In old age a pronounced degree of fatty replacement is seen in the parotid and less in submandibular glands. This relationship is similar to that in rats.

There is evidence that fatty change, involving degeneration of parenchymatous elements through accumulation of fat, is destructive. Aberrant cells are less abundant and conspicuous in human glands than in the rat material. Both show nuclear and cytoplasmic changes; however, they are hard to classify as a specific cell-type. Metaplasia of the small ducts to form true sebaceous glands was observed in both parotid and submandibular glands in one case. Such glands can be mistaken for groups of oncocytes.

Accumulations of lymphoid tissue are common in the salivary glands in old age in man and rat, whereas fibrosis is not common in the aging gland of either man or rat.

MANAGEMENT OF SHOCK AND CONVALESCENCE IN THE ELDERLY AND INFIRM.
F. N. Gurd.
Am. J. Surg. **83:** 379, 1952.

The extreme importance of preventing development of shock and hypotension in the elderly is emphasized. Resuscitation from shock is dangerous because of earlier onset of fatigue in the autonomic nervous system. The endocrine system and myocardium are participating in the above. Besides, serious visceral damage in the aged is higher than in younger individuals. An obvious result of hypotension upon the arteriosclerotic vascular tree is coronary, cerebral and venous thromboses.

The well-fed liver of good protein content is best calculated to resist intoxication and anoxia. The dangers of tubular kidney damage and congestive changes in the lungs are very pressing. The blood volume in elderly patients is extremely important. Decline in the nutritional status is a universal feature of old age. Frequently some degree of secondary anemia may be expected. Greater contraction of blood volume may exist in the elderly after trauma than in the younger adult.

The appearance of hopeless frailty characterizing elderly injured persons should not paralyze medical action. Many aged patients suffer from a more greatly reduced blood volume than that produced in young persons through similar injuries. Assessment of preexisting blood volume deficit and its inclusion in the calculated transfusion requirement are of vital importance. Patience and careful timing are the watchwords in avoiding overtreatment.

EFFECTS OF AGING ON THE AUDITORY ORGAN.
K. Fleischer.
Über Vorgänge des Alterns am Gehörorgan. *Ztschr. Altersforsch.* **6:** 147, 1952.

The morphological picture of ear trouble in elderly patients who are hard of hearing is discussed. The results of examinations of the petrous portion of the temporal bone in patients aged 70 and over are reported. Characteristic differences existing between the osseous portion of the cochlea capsule and the rest of the skeleton in old people are described. The bony portion of the acoustic labyrinth shows practically no osteoporotic deterioration, whereas senile osteoporosis is observed in the entire skeleton of the aged.

The most frequent findings in old people who are hard of hearing reveal peripheral degeneration of the cochlea. Clinically this presents itself in the aged as an affection of the inner ear, of the "ganglion type."

THE 1953 MEETING OF THE AMERICAN GERIATRICS SOCIETY

The 10th Annual Meeting of the American Geriatrics Society will be held at the Hotel Commodore, in New York City, May 28–30, 1953.

Authors desiring to submit papers for consideration for the program should send six (6) copies of a title and abstract not to exceed 300 words to the secretary, Dr. Malford W. Thewlis, 25 Mechanic Street, Wakefield, Rhode Island, by March 1, 1953. Fifteen minutes will be allotted for the presentation of each paper. Papers which are not actually read at the meeting will be listed on the program as being "read by title."

All members who plan to attend the meeting should reserve accommodations at the Hotel Commodore at an early date. The meeting is being held just before that of the American Medical Association and the hotels expect to be filled to capacity.

The Annual Dinner of the Society will be held on Friday evening, May 29, at 7:30 p.m. preceded by cocktails at 6:30 p.m. Women and guests of members are welcome.

The Annual Business Meeting will be held Thursday, May 27. The time of this meeting will be announced later.

CONTRIBUTIONS TO THE AMERICAN GERIATRICS SOCIETY

The importance of the pharmaceutical houses has long been recognized by men engaged in the practice of medicine. Through well-planned programs of investigation and a sincere desire to make available products of the highest quality, these organizations have become an integral part of medicine. The pharmaceutical companies have provided fellowships and awards for studies which have resulted in outstanding research and which have brought about important strides in our knowledge of medical problems.

The American Geriatrics Society wishes to express its appreciation to the following companies who have shown their great interest in the problems of geriatrics by making generous contributions to the Society:

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